GONOCOCCAL URETHRITIS

IN THE MALE

FOR PRACTITIONERS

By

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ILLUSTRATED

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PREFACE

THIS is not a text-book upon gonorrhea, nor has there been any thought of making it so. It is just a simple story simply told. Unhampered by the text-book writer's constant fear of leaving out something that his reviewer would expect to find, the reviewer has been forgotten and the story told as my experience has taught it to me. The text-books are needed, as the encyclopedias are needed, as repositories for the known facts. There is also need of books that offer more freedom of discussion and wherein these data can be arranged in a manner more easily understood. Most text-books upon gonorrhea leave us with a feeling of confusion and a desire to have the story told in a simpler way, with more about the disease itself as it really is. We would be told in a way we can understand how to treat it—just a simple, good plan of treatment and what to expect of it. These are the things I have tried to do.

I well recall my own ignorance of gonorrhea and its treatment during my years of general practice, and how little real enlightenment was to be obtained from careful readings among the text-books. They had the facts—too many of them—but these were so arranged that, try as one might, it was almost impossible to visualize and co-ordinate them. When it came to the question of treatment, the vast array of good things to do was so dazzling as to afford puzzling confusion rather than real guidance. With so many good plans of treatment suggested any choice seemed a good one. There was too much choice, and, in an effort to cure the disease more quickly than anyone should expect, so many methods often were tried that no plan had a real chance to do good.

In those days medical men freely voiced this confusion upon the subject, so that there was no reason to think my impression was exceptional. Subsequent years of contact with countless outspoken general practitioners and urologists have given no reason to think that conditions have changed greatly in this regard. The same general confusion about gonorrhea and its treatment still exists; the same foolish things are thought and done and the public pays in more ways than one. At least 90 per cent. of those afflicted are treated by men who frankly confess to themselves, and to their medical companions, that they really have but very meager knowledge of the scientific facts of the disease and of the precise methods of its most effective treatment.

If such things be true, and that they are can be shown by very little inquiry among physicians, there can be no question regarding the value of retelling the story so that one really can visualize what the disease does and what we must do if we would be of most efficiency in its cure. To this end an effort is made in the following pages so to correlate and arrange our knowledge of the disease that it can be easily understood; to unravel the endless skein of pseudo-science that has been spun about it; to strip it of its overload. Hitherto the available facts have been obscured and weighted down by countless misinterpretations; discoverable or deducible facts have been neglected. Consequently, treatment has blundered along for years out of mind. It is high time it should find the sound and well-defined course that is open to it.

The literature, particularly that from the laboratory, teems with truths which, when arranged in their proper places and interpreted in the light of our clinical observations, show that we have often been in error, at times foolishly so. In the hope of correcting some of these things I have not hesitated to take truths where I have found them and to interpret them as my experiences with the disease have taught me that they should be interpreted. In this it is possible I have been wrong at times. If so, there will be the more

grounds for discussion or difference of opinion, and this is a disease that needs much more discussion. With a thousand good debates upon gonorrhea the medical world might awake from its prolonged lethargy regarding it, and we should then know far more about it when the smoke of battle had cleared away. The public might at least hear the word gonorrhea, as it has the word syphilis, and would become wise enough to demand of the profession more knowledge and better treatment than hitherto offered it. Such a result would work much good. Publicly unspeakable and medically outcast, gonorrhea has limped through the years a veritable nobody's child. It is a serious disease and it needs serious attention.

In the present series of discussions no effort has been made to include all of those subjects in our modern text-books. To do so would result in more confusion than clarity. There is no need to repeat those matters of technic that are so well described elsewhere. The highest type of urology cannot be practised without the use of both the cystoscope and the urethroscope. The immense value of these instruments is beyond question and the technic of their use is better described than I could attempt. They are, however, instruments that only should be used by those specially trained to use them. They can do more harm than good in the hands of those who have not perfected themselves in their use. Their imperative need is limited to such a very small percentage of the cases herein discussed that they have been mentioned to condemn their too frequent use at times when no instruments should be used.

One who reads these pages with a closed mind will find much to criticise, for there has been no hesitancy about stepping out of beaten paths wherever the higher ground or even virgin country has seemed to hold the paths of truth. It has been found necessary often to show a cruel disregard for some of the idols that have been worshipped for years. This is one of those instances wherein the hoped-for end amply justifies almost any means. If these pages

can do even a little toward bettering our understanding of what is unquestionably our saddest and perhaps our most prevalent disease, I shall be well repaid for all the effort they have cost and for any criticism they may bring.

It is with sincere appreciation that I acknowledge my indebtedness to all of those who, through their writings or suggestions, have helped to lay the foundation whereon these pages are based. It is an equal pleasure to acknowledge my debt and express my thanks to Dr. F. S. Schofield for originally having urged the writing of the book, as well as his continued interest in its preparation; to Mr. S. C. Childs, whose generosity made possible much of the research work that helped so greatly in the understanding of a number of questions regarding the disease; to Mr. Erwin F. Faber for the great interest shown in the preparation of the illustrations, most of which are his work, and to Mr. R. W. Greene, of the W. B. Saunders Company, for his many kindnesses and courtesies.

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PART ONE

AN INTERPRETATION OF THE DISEASE AND ITS TREATMENT

Gonococcal Urethritis in the Male

I. INTRODUCTION

Physicians who do not treat gonorrhea in women sooner or later develop the idea that gonorrhea is rather a simple disease, and are prone to be somewhat indifferent as to its importance. Male patients are usually ambulant, and it is only when they have been guilty of sexual transgressions during the infective period that much thought is given the opposite sex. When one does turn his thoughts to the female aspects of gonorrhea he sees an entirely different picture. There is probably no sadder phase in medicine than that presented by gonorrhea in women. How a disease of such gravity to the human race could, in this age of decided breadth of thought and freedom of speech, continue to be such a secret thing is hard to comprehend. It would seem that by the sheer weight of the misery it produces throughout the world the word "gonorrhea" would force itself upon public notice.

Certain it is that we are not likely to do much toward the general eradication of a disease when even its name cannot be mentioned in public. We can watch nude women dance in our theaters, we can read about "moral turpitude," illegitimate children, divorces for infidelity in our newspapers; or analyze dreams for their "sex trauma content." We tell our children in rather plain language of the dangers of the too intimate commingling of the sexes, the stigma of pregnancy out of wedlock, the ravages of syphilis, and then we have to call gonorrhea the "social disease." What a queer people we really are! And, while we thus imitate the ostrich by hiding our faces in shame over a little word, count-

less people must suffer infection by a disease that could, with a little general publicity and a lot of medical care, be greatly limited in its spread.

When one views the obtainable statistics upon this disease he is saddened to see that they are generally interpreted in dollars lost. Perhaps it is true, as one would be led to think, that nothing appeals to the world as worthy of correction unless it bears the dollar-mark. Great Britain has suffered the loss of many millions of pounds, Germany many millions of marks, France many millions of francs, and our own country many millions of dollars, all because of gonorrhea. Frightful losses, all of them, but what were the dollars, pounds, or francs as compared with the real human losses? How many women had their lives ruined? How many of their children became blind? How many suicides were there? How many homes were ruined? How many deaths were there? How many were robbed of the right to bear children?

Inquiry among those who treat gonorrhea in men is sure to elicit the opinion that the disease is on the increase. It certainly is not decreasing greatly, if at all. The educational efforts expended upon our men in the late war have borne but little apparent good. That campaign of fearfulness has not seemed to frighten even the most timid. It is an age of courage and experimentation, wherein the more advanced in years follow the lure of youth and youth craves experience, and often gets it. If, on the other hand, even a small portion of this teaching could have been exerted toward lowering the percentage of ignorance about such things among young women it probably would have borne greater fruit. We let our young women grow up with little or no knowledge of venereal diseases, or how they are contracted. Most of them, if they ever think of the matter, are of the opinion that they are diseases of filth and not to be found among our "best people." It is unfortunate that they remain in ignorance of things that may mean so much to them.

It is not the writer's opinion that there is error on the side of virtue in that older estimate that "at least 80 per cent. of all men in large cities contract gonorrhea at some time during their lives." The estimate is probably highly charitable, 95 per cent. perhaps would be nearer the correct figure. If that further statement that "20 per cent. of all married men contract the disease, and 45 per cent. of these infect their wives," has even a fraction of truth in it, the matter assumes a degree of importance for women that is even more appalling. This importance becomes decidedly enhanced by the estimate that from 60 to 80 per cent. of all the operations for diseases of the uterus and its adnexa are for lesions occasioned by gonorrhea. We know that there are thousands of such operations done every year, and if only a small percentage of those done were thus occasioned, it would still be one of the most important subjects of the day. Likewise, thousands of women with permanently damaged genital tracts never come to operation, but lead lives of complete or semi-invalidism through the ravages of the gonococcus. If more were needed, the estimate that at least 25 per cent. of all of the blindness in the world results from gonorrheal ophthalmia contracted at birth, would stamp the question of the prevention of gonorrhea as one of the most urgent needs of the age.

Much thought has been given the question from a sociological standpoint, but action upon these thoughts has been hampered by public mock modesty. The question is a very broad one, requiring the co-operation of all of those in any way interested in the welfare of humanity. There are, however, essentially medical aspects of the matter to which we would do well to give great consideration. One cannot go far back in the history of a particular strain of gonococci without being met by facts demanding sober thought. In tracing the source of a given infection the most common finding is that it was acquired where one or many physicians had said it did not exist. As none of us believe in the

spontaneous generation of gonococci, we are forced to the conclusion that they were wrong. Such a conclusion raises the question as to how much of the gonorrhea in the world today is here because of the sins of omission or commission of our medical profession. It brings up thoughts of that "endless chain," from which it does not greatly differ. Obviously, it is our duty to see that the "chain" is broken in all of its ramifications, for, remaining unbroken, it, like that little brook, "runs on and on forever."

We should, of course, be interested in the broad phases of the question, but, as a group, we can do more toward its solution if we are just a little more timid about pronouncing patients cured of the disease. Some of the saddest chapters of human existence have hinged about the too hasty assurance of recovery, based upon studies that had little chance of absolutely proving cure. Were we to exercise the greatest possible care in this regard, within a few years we should reduce the incidence of gonorrhea more than all of the other agencies are likely to do in a much longer period.

To one who has seen much of gonorrhea it is obvious that the proofs of cure in the male and the female are two entirely different things. One cannot help feeling that those who pronounce women "cured" have a degree of optimism that far outruns their medical science. That they must commonly be in error is proved by the fact that most males contract the disease from these "cured" women.

There are gynecologists of wide experience and undoubted veracity who believe that female gonorrhea rarely is cured. Surely the history of the subject would suggest that they may know what they are talking about. They have many facts on their side. Under these circumstances, why should such efforts be made to assure women that they no longer are infected? What real, incontrovertible proofs can we exhibit that such is the case? Would it not be best to be honest with these women until we

do find a real specific for the disease, or a positive proof of cure? We do not *know* that they are well, we only *think* they are, and if we were a little more frank with them there would be less gonorrhea. Some women would be careless, but, on the other hand, most would not.

The same difficulty rarely attaches to the determination of cure in the male, and there is little excuse for the spread of the disease from this quarter after it is once known to exist. It obviously cannot be laid to the door of the medical profession that many men transfer the disease during the period of its incubation. However, by far the greater number of infections are transferred during the latent periods of the disease, or after the patient has been told he is cured. As a matter of fact, we rarely *know* just when a man is cured, and the possibility of error is great. We consequently should advise every precaution against transference of the disease for some months after we *think* cure has been accomplished.

Except with the colored race and a few morons it is extremely rare to find a man who will deliberately expose another to infection if he knows he has gonorrhea. Not only does this apply to the known period of infection, but it can be made to apply equally to that period of probation thereafter. If apprised of the possible dangers to others, almost all men will so deport themselves, for a time at least, as to prevent the spread of the disease. As a matter of fact, the disease, if latent, is practically always stirred into activity by one of the first few sexual contacts, and precautions after this are for the extreme but possible exceptions.

While, in the succeeding pages we shall devote ourselves largely to consideration of gonorrhea and its treatment in the male, the larger sociological aspects of this dread disease never should be lost sight of. It is only by such an attitude that we can hope to limit its spread, for most of the responsibility for such limitation rests upon our shoulders. We cannot blind ourselves to the fact

that the world is filled with a disease that usually is hidden from all save the physician, a disease the very name of which is outcast, that loves to lie dormant until stirred to activity by just those human events that favor its transference to others. Such a knowledge makes it imperative that we not only give our closest attention to its cure, but that we bend every effort toward controlling and so instructing our patients after we think they are cured that they do not transmit the disease to others.

II. APPLIED ANATOMY

To understand the course of gonorrhea one really must be able to visualize the anatomy of the urogenital structures. There is probably no disease more influenced by the gross and microscopical anatomy of the parts involved. One is hardly likely to retain the required knowledge from his early dissecting-room experiences, though they will serve as a hazy background whereon to draw a clearer picture.

Confining ourselves, as we are in these discussions, largely to the lower portions of the urinary tract and the genital apparatus, it will be best if we consider the anatomy of the intrinsic portions of these structures, leaving the more remote parts for collateral reading.

In its greatest simplicity the lower urinary tract is a double-bulbed syringe. The larger bulb, the bladder, is connected to the smaller bulb, the bulbar portion of the anterior urethra, by a short tube comprising the posterior and membranous portions of the urethra. The inferior, or distal bulb, superimposes the barrel of the syringe, the anterior urethra, with the external urinary meatus as its nozzle. Not only does it resemble a double-bulbed syringe, but it has the same function. The larger bulb discharges its contents through the urethra by pressure of the abdominal viscera and contraction of its own muscles, after which the lesser bulb is brought into forcible contraction to expel any fluids remaining in it.

The mode of emptying of the larger bulb does not appear to the cystoscopist to square exactly with what the physiologists tell us. Observing from the inside during this process, one forms the opinion that the contraction of the bladder muscles has little

to do with emptying of this viscus. It is, in fact, rare to see the bladder wall in general contraction during the evacuation of its contents through the cystoscope, except where the organ has been irritated by very rapid filling or in the presence of violent cystitis.

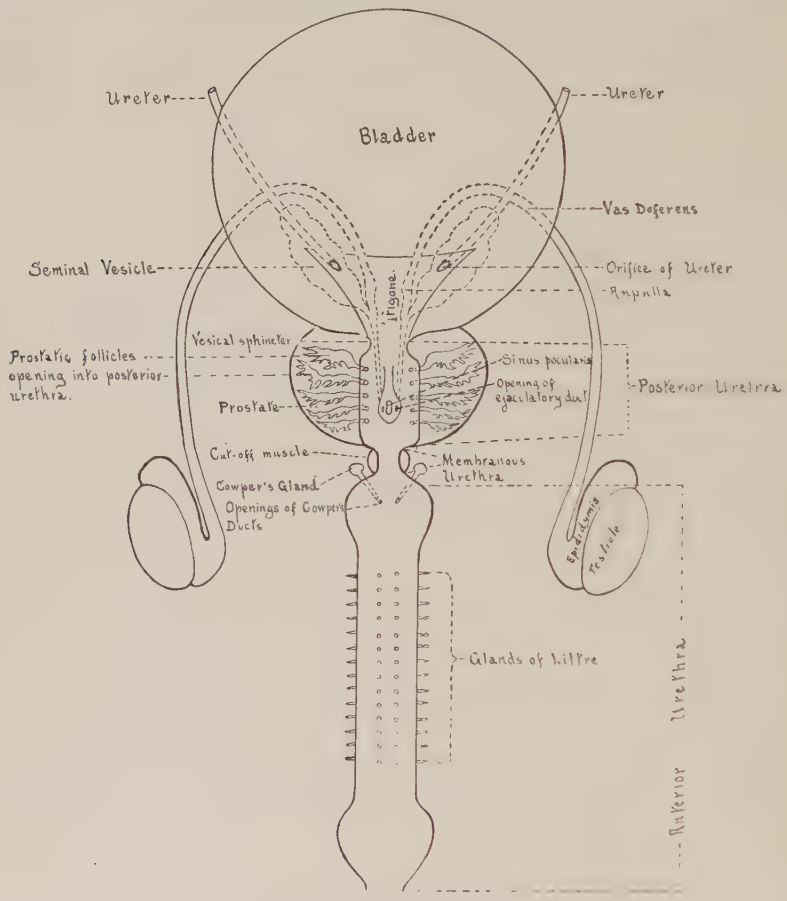


Fig. 1.—Diagrammatic outline of the lower urogenital tract.

Under these latter conditions the entire mucous membrane is puckered up into countless irregular convolutions. This is quite the contrary to the intravescial appearance prevailing when the bladder is not inflamed or irritated by rapid overdistention. Normally, the organ collapses by having its postero-superior wall bulge

forward and downward, the obvious result of the pressure of extravesical structures. It is just as though one squeezed water from the hole in a rubber ball by pressing it with the tips of the four fingers, and when it was almost empty made slight pressure upon the sides. If the bladder musculature is studied by stretching the dissected viscus over a glass hemisphere and holding it up to a strong light, it can be demonstrated without room for doubt that its contraction could not possibly cause it to collapse in this manner.

Our lesser bulb, on the other hand, empties itself quickly by the voluntary contraction of its musculature, the accelerator urinæ muscle. This very interesting and important muscle surrounds the bulb of the urethra, and, if for any reason it fails to contract, the contained fluids merely dribble out as the result of ordinary tissue pressure. Such a condition occurs as the result of excessive sexual indulgence or general poor muscle tone. It causes much annoyance to the patient, and at times some chagrin to the physician, for, unless he is familiar with it, he is prone to view it as evidence of a stricture of large caliber and treat it accordingly.

The filling and emptying of both of these bulbs are dependent upon a proper nervous and muscular balance of the sphincteric muscles of the urethra. The internal or vesical outlet sphincter is rather a weak muscle, the function of which seems to be tonic contraction. If we are to judge from the studies of Wesson[1] it has no great powers of relaxation, but must be opened by the action of other muscle-fibers. He has shown muscle-bands which run from the ureteral orifices through this internal sphincter and attach themselves in the floor of the posterior urethra. Passing in an arched direction over the posterior rim of the vesical outlet, their contraction obliterates their arched direction, and in doing so opens the vesical outlet and allows the bladder contents to

[1] Young's Practice of Urology, vol. i, p. 9. W. B. Saunders Co., Philadelphia.

flow into the posterior urethra as far as the membranous portion of the canal. The membranous urethra is surrounded by a strong sphincteric muscle which, except during the act of urination or ejaculation, remains in a state of tonic contraction. The relaxation of this so-called cut-off muscle in health is entirely a voluntary procedure. Its volitional action, however, is commonly interfered with psychologically to the extent that, though its owner wills to relax it, he, at times, finds it impossible to do so. There are few body functions more subject to mental inhibitions than the action of this muscle, and it is often the cause of much annoyance to its owner. It needs but the mental impression that it will not relax to make it fail to do so. The cut-off muscle marks the dividing line between the anterior and posterior portions of the urethra. Its tonic contraction makes of the anterior urethra a blind pouch, except during urination.

At the distal extremity of the anterior urethra is the external meatus, which is generally the narrowest portion of the tube. From the standpoint of utility this narrowing at the meatus is a wise provision, as it serves to accentuate the propulsive force of the urinary stream. It could, however, be criticised on other grounds. It serves to greatly increase intra-urethral pressure during the act of urination, and the tract was not well planned to withstand great distensive force. In health this is rarely of great importance, but in the presence of urethral disease it is at times a matter of much moment, and even a determining factor in causing troublesome complications.

Viewing this canal in the upright position in anteroposterior section, it will be seen that it has some architectural faults in so far as its drainage possibilities are concerned. The posterior urethra lies between two tonically contracted sphincters, so that, except during the act of urination, drainage of its purulent products is solely dependent upon the forcing of the weaker sphincter. The floor of the bulbar portion of the anterior urethra occupies a

much lower level than the penoscrotal angle, so that its purulent products must be carried up hill by tissue pressure or by contraction of the accelerator urinæ muscle. As this latter is entirely a voluntary act, and practically does not take place except during ejaculation and after the act of urination, it is not a great factor.

Following our study of these conducting structures, we find the posterior urethra surrounded by the somewhat resistant pros-

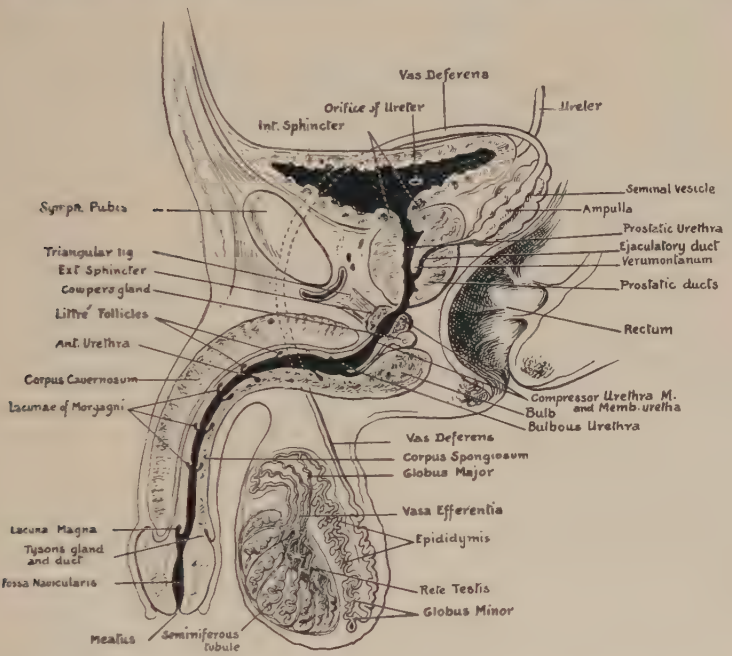


Fig. 2.—Diagrammatic mid-section view of the lower urogenital tract.

tate gland. This gland empties into the urethral lumen through many very small channels on each side of the midline upon its "floor." Upon this floor in the midline we find a raised ridge, the verumontanum, in the anterior surface of which is a small depression about $\frac{1}{4}$ inch deep, the sinus pocularis. To each side of this opening, rarely within it, are the openings of the ejaculatory ducts. The ejaculatory ducts pass diagonally through the prostatic substance to join the seminal vesicles and ampullæ.

Here again one could criticise structural arrangement, for these smaller channels have no protective sphincteric muscles at their outlets and circular muscular fibers are lacking in the ejaculatory duct.

The anterior urethra is surrounded by the corpus spongiosum. The canal is lined by a very delicate mucous membrane, with numerous minute tubular glands passing down into its submucous layer. These glandular offshoots pass, as a rule, diagonally backward in the penile urethra and forward in the bulbar portion, and may be either single or branched tubules. They are known as the glands of Littré and the crypts of Morgagni. Due to their minute size they offer ideal points for gonococcal colonization. One quite large crypt, situated in the roof of the anterior urethra just proximal to the slightly dilated portion, the fossa navicularis, is known as the lacuna magna.

At the junction of the fossa navicularis and the penile urethra is a narrowing fold of mucosa. This fold is occasionally of such a nature as markedly to interfere with urination or the drainage of the canal.

Passing from the floor of the bulbar urethra are two small tubules to Cowper's glands, which are situated between the two layers of the triangular ligament on each side of the membranous urethra.

The membranous urethra, lying as it does in the tonic grasp of the cut-off muscle, and containing, as a rule, no glandular structures, is of interest to us solely as a barrier to the extension of infection backward.

The prostate gland presents a stroma of muscle and fibrous bands surrounding its glandular structures. Its drainage is dependent upon contraction of these intrinsic muscle-fibers, contraction of the extrinsic muscles, and tissue pressure, and the three are woefully insufficient in the presence of infection.

The seminal vesicles are composed of continuous or branched

convoluted tubes that vary in caliber and length. They underlie the bladder base posterior to each lateral prostatic lobe and pass diagonally outward. Their drainage possibilities are extremely poor, being dependent upon either ejaculation of a virtual "overflow of retention." For this reason they are likely to harbor infections for long periods of time, having once become infected.

At the junction of the seminal vesicle with the ampulla of the vas deferens and the ejaculatory duct is a peculiar valve forma-

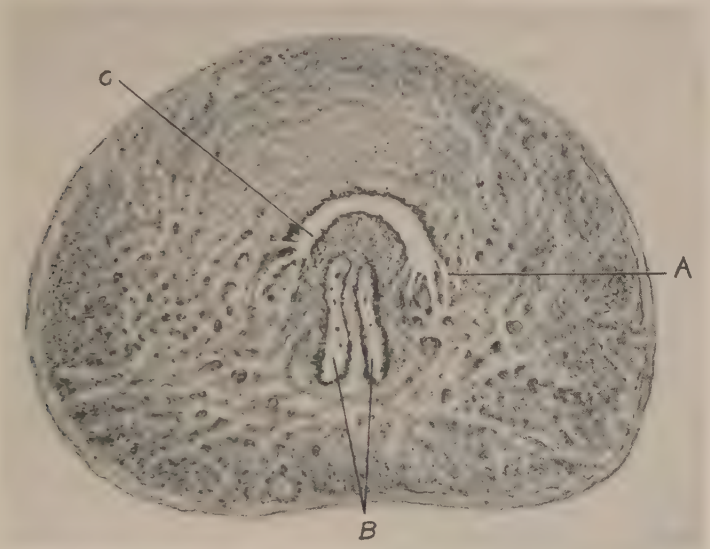


Fig. 3.—Cross-section of the prostate gland at the level of the verumontanum: *A*, Ducts of the prostatic acini; *B*, ejaculatory ducts; *C*, posterior urethra.

tion. The arrangement of this is such that substances coming by way of the vas or the ejaculatory duct will pass into the vesicle before escaping through either tube. This is of particular interest in our study of the transference of gonorrhea to these structures and the epididymis.

The vas deferens passes from its dilated portion near the seminal vesicle, the ampulla, in a curved direction upward, outward, and forward to the inguinal canal. From thence it passes

downward into the scrotum to the epididymis. This canal, due to its wave of peristaltic contraction toward the ampulla and the direction of its fluids, enjoys some natural protection against infection.

The epididymis lies posterior and superior to the testicle, and is composed of the extremely tortuous foldings of a single, small canal, the lumen of which can be closed off by the slightest inflammatory swelling. It has practically no drainage possibilities, so that acute infections of it must either undergo resolution or abscess formation. Gonorrheal infection rarely, if ever, passes beyond the epididymis to the testicle.

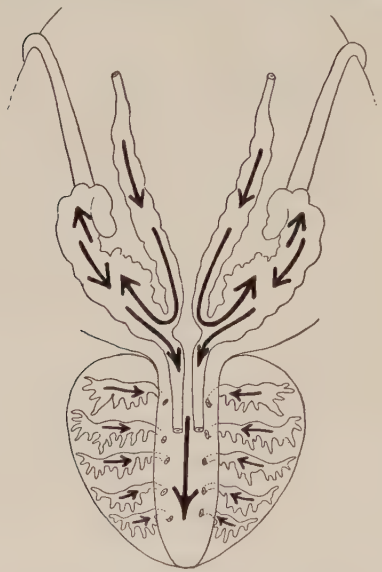


Fig. 4.—Diagrammatic outline of the prostate gland, seminal vesicles, and ampullæ to illustrate the normal directions of their fluids.

The anatomy of the bladder in its entirety is of little importance in the study of gonorrhea. The disease rarely passes beyond the trigone, that triangular area upon the bladder floor the posterior angles of which are at the ureteral orifices and the anterior angle of which is at the vesical outlet. The trigone has some glandular structures penetrating its surface, but they seem rarely, if ever, to retain gonococcal infections.

The ureters are likewise of little importance in our present study. Besides the protection afforded by their sphincteric openings and the intermittent flow of urine through them, they evidently enjoy much native resistance to such infections.

Aside from these normal structures, it is well to bear in mind

that abnormal mucous channels opening at or near the external urinary meatus are of frequent occurrence. These minute juxta- or para-urethral sinuses open in different places and pursue a

Fig. 5.—Diagrams to show the more common locations of the openings of para-urethral sinuses and the courses pursued by these abnormal mucous channels.

number of different directions, as will be seen in the accompanying illustration.

III. NORMAL HISTOLOGY

THERE have been many very careful histological studies made of the entire urogenital tract by those well able to differentiate the various types of tissue. As one compares the findings of these investigators regarding the mucous membrane of the male urethra he meets with many differences of opinion as to just what varieties of cells line the different portions of the canal. In such a comparison it early becomes apparent that the differences are not with the histologists, but with the urethræ; that, while of most individuals certain definite statements can be made in this regard, there are also those in whom marked exceptions occur.

A knowledge of the types of cells that line the different portions of the urethra is of the greatest importance to one who would understand gonorrhea in the male. From a study of the course of the disease it is much in evidence that most individuals possess urethral mucosæ that rather closely follow the description most commonly met with in the text-books upon the subject. For this reason a brief description of these will be given first, and, as the aberrations from what we will call "normal" are evidently not rare, those then will be pointed out.

In most instances the fossa navicularis for a distance of almost a centimeter is lined with stratified squamous cells. Beyond these we find columnar cells as far as the bulbomembranous junction. In most areas there is but a single layer of these cells, while in some there are several layers of differing shapes beneath the superficial cells round, cuboidal, and caudate. The columnar cells likewise line the many small glandular offshoots of the canal. In the depths of these canals we find true secretory epithelium.

Beginning at the bulbomembranous junction, and extending throughout the posterior urethra, bladder, and ureters, is what

has been called transitional epithelium, though the smaller mucous channels emptying into these structures are lined with columnar or cuboidal cells.

At rest transitional epithelium is practically a stratified cuboidal epithelium that flattens out into squamous-like cells when the

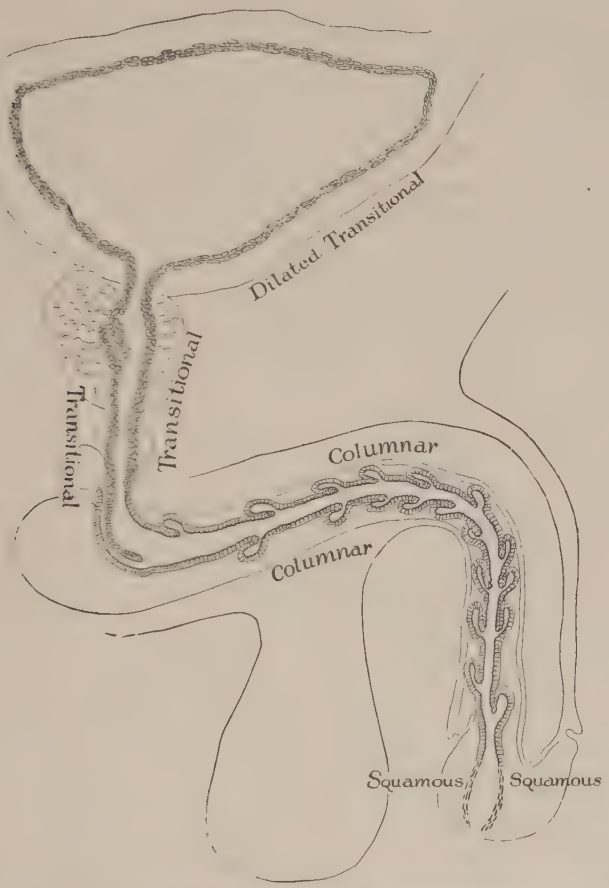


Fig. 6.—Diagram to show the usual locations of the various types of cells lining the lower urinary tract.

cavity it lines becomes fully dilated. As the dilatability of these cavities differs greatly, it is apparent that in some areas the cells are never really flattened out, but remain as stratified elements of

varying shapes. As these changes seem to have a very definite relation to the susceptibility to gonococcal infections, it is well to consider them carefully. The membranous urethra, being in the grasp of the compressor urethræ muscle, and the posterior urethra, being surrounded by much muscle tissue as well as the decidedly resisting prostatic substance, their dilatability is definitely limited. It is, therefore, probable that their cells remain as stratified cells of considerable thickness and never flatten out like those of the bladder wall. Likewise the trigone and the vesical outlet, being rather firmly fixed to the subjacent tissues, do not dilate sufficiently for their cells to become greatly flattened. The same could be said of the ureters and kidney pelves.

While there are some slight differences in the submucosæ of these areas, they seem not to be of any great importance in our present study except in so far as they favor the dilatability of the different surfaces. The bulbar, membranous, and posterior urethræ have marked musculatures that are almost absent anterior to the bulb.

The ejaculatory duct has no muscle tissue except near the seminal vesicle, while in the vesicle, ampulla, and vas deferens the circular muscle-fibers are marked. All are lined with columnar cells. In the lower extremity of the vas deferens and the epididymal tube many cells present cilia, which, however, are non-motile.

The general bladder wall is lined with cells which, when the viscus is undilated, are exact counterparts of those of the posterior urethra and trigone. As the viscus dilates, however, they change so greatly in shape as to become but two layers of flattened or squamous-like cells.

Viewing the foregoing as the normal, it is important to realize that there are decided variations from it in some individuals, and that these variations may in a measure explain some of the clinical differences in the course of the disease. Under the pathological histology we shall consider the subject from the standpoint of the

varying susceptibilities of the different types of mucosæ, but we must have a clear conception of where these types are found.

At times the fossa navicularis is lined with columnar cells and not with squamous. In some the expanse of columnar cells extends from the fossa navicularis to the verumontanum. In others the columnar cells disappear at the anterior extremity of the bulbar portion of the anterior urethra and are replaced by transitional cells. Again, all histologists have encountered islands of squamous cells throughout the canal, and many speak of islands of columnar cells in the posterior urethra. Occasionally the membranous urethra is lined by squamous cells.

From this it will be seen that structural differences afford ample reason to expect a number of clinical variations in the course of gonorrheal urethritis in the male; that, as different types of cells differ in their ability to withstand infection by the gonococcus, certain urethræ are less protected than others and would be expected to behave differently. To some nature has been kind, while dealing less fortunately with others.

IV. THE GONOCOCCUS AND ITS PECULIARITIES

It is probable that there is no pathogenic micro-organism with more firmly fixed habits than the gonococcus, and in order to understand the disease it produces one must know its habits. A sketchy knowledge of only a few of the oddities of the gonococcus makes but a meager foundation for a broad knowledge of gonorrhea in its various phases. For this reason let us spend much time in making our foundation so ample that we can build upon it a superstructure that will at least take us out of the ruts we have followed for years. Much of the present confusion is due to the fact that such hazy ideas prevail about the behavior of this germ as revealed by laboratory and clinical study. We do not have to know every little peculiarity exhibited by the gonococcus, but we should know those that have a direct bearing upon the course of gonorrhea, and, as we view the data accumulated in various fields, we shall find much that is of the utmost importance to us.

The gonococcus has no doubt about where it wants to live, and, having found its ideal habitat, strongly objects to other bacterial company. It wants the field to itself and, in its younger days, in its chosen community, banishes them all. It could, with some truth, be called the "bacterial pioneer," because it routs the aboriginal germs that have inhabited the field but produced nothing. It lives for a while a very busy life preparing the soil, so that when it dies those aboriginal drones, the staphylococcus, pneumococcus, diphtheroid, colon bacillus, and others, can, with rather less vigor, carry on its work. Choosing at first a broader field of activity the gonococcus seldom has the tenacity to hold its entire ground, but gradually leaves the open country, the free exposed mucosa, and seeks the more protected spots, the smaller mucous channels, where it makes its last stand. Coloniz-

ing in these little "block-houses," it from time to time makes sorties into the "open country," only to be driven back to its retreat where, in the male, it finally is annihilated.

The gonococcus abhors aridity, and if, by chance or design, it is transported from the home of its choice, it quickly dies unless it has much moisture. Lacking such humidity it survives but a few hours, so that it is not found in nature far from its home. Nature thus has done much to prevent the spread of the disease by indirect contamination, although she has given mankind such a terrible urge in the direction wherein these woefully prevalent infections are most always contracted in adult life.

In the bacterial world the gonococcus has some near relatives from which it does not differ in shape. They often resemble each other so closely in many ways that they are very difficult to differentiate; indeed, in legal circles, such similarity has at times caused physicians much embarrassment. Because of this, and the great sociological reasons for accuracy regarding gonococcal infection, we should know wherein the gonococcus differs from its near and remote relatives.

To begin with, it has been misnamed, for the true meaning of the word is that it is a berry-like organism that causes a flow of semen. It is not, and it does not. The single element is composed of two parts that are slightly more than hemispheres with their flattened or concave sides facing one another and divided by a very narrow aperture. It has this shape in common with a number of bacteria, the best known of which are the meningococcus and the Micrococcus catarrhalis. As the true cocci, such as the staphylococcus and the streptococcus, reproduce by fission, there is a stage in their development wherein they cannot be morphologically differentiated from the others. Particularly does this apply to the staphylococcus and, as it is an inhabitant of almost every urethra, one must be ever on his guard lest he make the sad error of calling it the gonococcus.

The meningococcus probably never is found in the genital tract, certainly not in the absence of a true meningitis, so that it is of but scientific interest in the present discussion and need not be accorded great importance from a clinical standpoint.

The Micrococcus catarrhalis, on the other hand, does occur at times in the genital tract, particularly in women, and upon very rare occasions may be an element of confusion. It is said that this bacterium is never found in the polymorphonuclear leukocyte of urethral pus, whereas the gonococcus almost always is. Both germs exhibit the same staining characteristics, as does also the meningococcus. Such being the case, the only safe method of differentiation lies in their differing cultural characteristics, which will be considered later.

The streptococcus, owing to its characteristic chain-like arrangement, is not really a confusing element, but the staphylococcus commonly is. So closely does this latter resemble the gonococcus in the purulent discharges that it only can be told from it by the Gram stain or culture. This germ upon rare occasions is found within the leukocyte at its fission stage, for which reason a thorough knowledge of the Gram method of staining is absolutely essential to one who treats gonorrhea. In one's interpretation of this stain it must not be forgotten that rapidly growing staphylococci produce many Gram negative diplococcal elements. Partially digested intracellular staphylococci may be Gram negative. They are, however, always in association with the Gram positive elements. The knowledge of their occurrence should deter one from making a diagnosis of gonorrhea from Gram negative diplococci lying in clusters of Gram positive staphylococci. The error, however, has been made rather frequently. Great caution should be exercised in the interpretation of the Gram stain in smears from cultures upon enriched media. Twenty-four-, and at times even forty-eight-hour cultures of the staphylococcus upon the media generally used for gonococcus culture often show so many

Gram negative diplococcal forms as to favor great error in diagnosis. Subsequent studies of these cultures generally will show

Fig. 7.

that all of the germ elements have developed their Gram positive and usual morphological characteristics.

The Micrococcus catarrhalis differs from the gonococcus in that it grows readily in ordinary culture upon plain agar, and it

does not, as a rule, ferment any of the sugars. The gonococcus does not ferment maltose, whereas the meningococcus does. Pre-

Fig. 8.

cipitin tests are of little practical value in differentiating these bacteria that so closely resemble one another.

For the further differentiation of cultures of these closely allied bacteria the alkali solubility test of Thomson is of great

value. This test is performed by washing the growth from a slant with N 20 sodium hydroxide solution and vigorously shaking the suspension. Gonococci in this solution are very quickly dis-

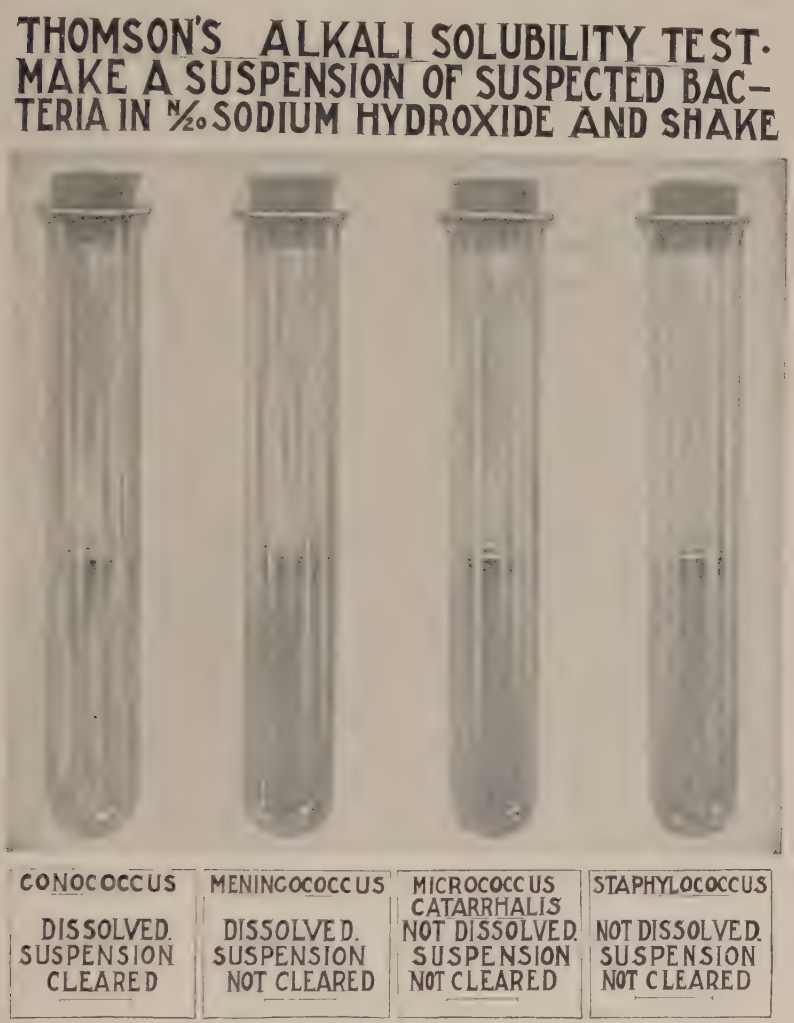


Fig. 9.

solved and the fluid becomes clear, whereas the other confusing bacteria, excepting the meningococcus, are not, so that such suspensions of them remain hazy or definitely opaque, depending

upon the number of bacteria they contain. The meningococcus is dissolved, but there remains a slight opalescence to the fluid.

THE GRAM STAIN

The most reliable of all of the many modifications of the original Gram method of staining is probably that adopted by the American Association of Bacteriologists. In it one uses five different solutions. If they are arranged in rotation, the entire process can be safely done in a minute's time. Their actions are so immediate that there is no added value in prolonging the exposure to each.

These solutions are as follows:

Number 1. One per cent. Methyl Violet 6 B, in Water.

Number 2. Five per cent. Sodium Bicarbonate, in Water.

Number 3. Iodine, 2 gm.; Normal NaOH, 10 c.c., and Water, 90 c.c.

Number 4. Acetone.

Number 5. One-tenth of 1 per cent. Basic Fuchsin in Water.

Made with distilled water they do not deteriorate for months and, carefully used, give uniform results.

The slide containing a thin smear of the suspected material is passed through a Bunsen flame several times to dry and fix. A few drops of methyl-violet solution and a smaller amount of the sodium bicarbonate solution are placed upon the smear. After about twenty seconds this can be poured off and the iodine solution added for an equal length of time. It is then washed with acetone until no more color comes away, after which it is copiously washed with water. The counterstain is applied for a few seconds and washed off with water. The specimen is dried by blotter or in the flame and studied without the use of a cover-slip.

By this method of staining bacteria are divided into two large groups, depending upon whether or not they contain a certain substance which, when stained with an aniline dye and sub-

jected to iodine, causes the dye to become alcohol and acetone "fast." Those that retain the stain are Gram positive, and those that do not are Gram negative. As such treatment renders the latter transparent they must be stained with some contrast color to be seen. As stained under this technic the gonococcus is pink or red, depending upon the speed in removing the fuchsin, and the Gram positive elements are a dark purple or black.

$$\text{Smear} + \text{Dye} + \text{Iodine} + \text{Alcohol or Acetone} = \begin{cases} + \text{ Holds dye} \\ - \text{ Bleaches} + \text{Counterstain} \end{cases}$$

In view of the fact that many individuals who have not gonorrhea have urethral discharges which cannot be told macroscopically from those due to the gonococcus, microscopic study of these discharges is imperative. Otherwise the possibilities of error are great and the unfortunate consequences are often highly deplorable. Particularly does this apply to the cases of those patients who are married. No one should assume the responsibility of pronouncing them gonorrheal or otherwise unless fortified by at least a Gram stain.

The technic of such microscopic studies is so very simple that it should be done by every physician who treats gonorrhea. It can be done well within five minutes; it gives information of the greatest value to the doctor, and it engenders much confidence in the mind of the patient. Sending such slides to a laboratory for study is far better than no study; but it denies one much knowledge as to the progress of a given case that is of great value in planning appropriate treatment.

CULTURAL CHARACTERISTICS

There are few, if any, pathogenic micro-organisms that have been given more false leads from a cultural standpoint than the gonococcus, and none about which more fiction has been spun. The result of this has been a wide-spread conviction that it is an

extremely delicate germ, and can only be grown with the greatest care. The real truth of the matter is that if just a few conditions are complied with it is as easily cultured as most bacteria. For this reason much of the literature upon it should be rewritten, for in it medium faults have been interpreted as peculiarities of the germ itself. We have been led to believe so many things in this regard that are either not true, or only partially true, that there is need for discarding many of the widely held but erroneous ideas on the subject. Let us, then, simplify matters by a consideration of those basic points that can be easily proved to be true.

To begin with, we need for the culture of the gonococcus three things: good food, much moisture, and proper temperature. The first two are rather fixed requirements, and the third, which we have been given to believe was most fixed, is perhaps the most elastic, as will be seen later. There is little need to discuss the question of moisture, for it is imperative in all media for good growth of the gonococcus.

When we turn to the question of what is good culture-medium we find that we are woefully ignorant of the actual needs for bacterial growth. It is probable that a very small percentage of the substances used is what the germ actually requires and that the rest is overload. From a consideration of the substances upon which the gonococcus will grow, it would seem a simple matter for the chemists to determine just what its real needs are.

Starting with our most common medium for bacterial growth, agar, it will be of interest to consider what changes are made in its fitness for gonococcus culture by the addition of certain substances. Upon the usual agar medium the gonococcus will rarely grow in fresh culture. In old subculture it will grow for about two generations and die. Its growth thereon is characterized by a prolonged "lag-period," three of four days commonly elapsing before it is macroscopically visible. Such growths are usually along the margin of the water of condensation, and seldom present

more than a few large, thick, irregular colonies. The germ lives for about a week, when its period of autolysis sets in and it rather

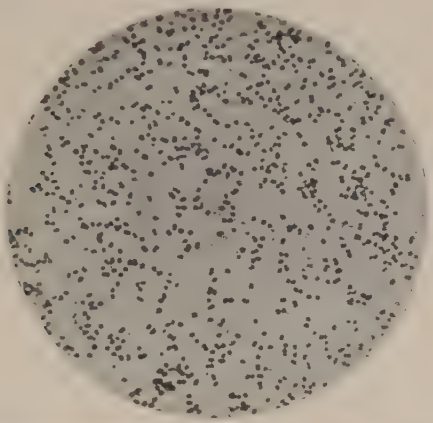


Fig. 10.—The gonococcus from culture during the period of viability (David Thomson).

quickly dies. The subculture from it upon the same medium is usually much more scanty, and the bacteria are so weak that they

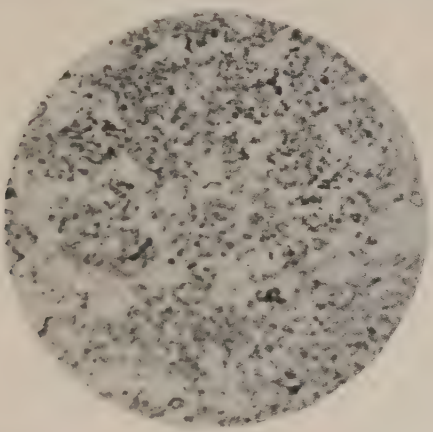


Fig. 11.—Gonococcus from culture during autolytic stage (David Thomson).

seldom can be found in further subcultures. Some laboratory workers claim to have perpetuated the same strains of gonococci for years upon plain agar medium. However this may be, it is

not the general experience in gonococcus culture. It is one of those claims that make one wonder where the error lies. As some investigators claim to have obtained the original culture and to have perpetuated it upon this medium, it does not rest in gradual adaptation of the gonococcus to this medium. In the writer's hands plain agar has been highly unsatisfactory, and he has been unable to obtain any growths from fresh pus upon it.

If we add a small percentage of ordinary cornstarch to our agar the picture of our subcultures is entirely different. The "lag-period" is shorter, the period of viability is slightly shorter, the growth is much more luxuriant, and it can be repeatedly sub-cultured upon the same medium. Also the gonococcus will grow well in initial culture from pus.

By adding powdered charcoal to agar we meet with the same success that is obtained by the addition of cornstarch, the growth seeming even slightly more luxuriant.

The addition of albuminous substances, such as hydrocele or ascitic fluids or blood-serum to our agar, makes a greater change. The "lag-period" is reduced to from twelve to twenty-four hours; the growth is very luxuriant, and it can be cultured indefinitely, but its period of viability is reduced.

The addition of calf's brain makes an even greater change. The luxuriance of growth is the same as we find on the albuminous media, but the germ will survive upon it for from three to six weeks or longer.

Because of the luxuriance of growth and the ease with which subcultures can be made upon them the albuminous media have been considered our best media. They, however, have very obvious disadvantages, which have done much to discourage the study of the gonococcus. Their ingredients are, at times, difficult to obtain in bulk, require much handling, which increases the dangers of other bacterial contamination, and they cannot be sterilized by heat. The period of viability upon them is so short that sub-

cultures must be made within seventy-two hours to perpetuate the growth.

To surmount these disadvantages the writer tried a great many substances before he finally found one that made gonococcus

Fig. 12.

culture equally as simple as that of other routine laboratory cultures. With the assistance of Dr. L. E. Viteri this medium was tried as to percentage of positive cultures from gonorrheal pus,

duration of viability, and perpetuation through indefinite subculture. In the first and third particulars it was equally as good as hydrocele agar, and in the second it was far superior, as cultures were found to survive after an average of six weeks. These features, together with the ease of obtaining the ingredients anywhere, and the simplicity of its making, give ample ground for feeling that the medium in question is a decided advancement. The fact, moreover, that the last step in its manufacture is sterilization in the autoclave gives it a distinct advantage over any of the albumin-containing media.

The entire preparation of the medium is as follows:

A calf's brain weighing approximately 500 gm. is forced through wide-meshed cotton-gauze into 500 c.c. of distilled water, and allowed to mascerate in the ice-box for from twelve to twenty-four hours. It is then boiled and filtered by suction through cotton of varying degrees of compactness. No matter how often it is filtered the filtrate remains turbid. This is made to 500 c.c. by the addition of water and 0.5 per cent. acid sodium phosphate, and 1 per cent. of peptone are added. It now can be autoclaved at 15 pounds pressure for twenty minutes and kept as stock bouillon, or it can be carried on to completion.

To complete the medium it is necessary to add 1 part of brain bouillon to 3 parts of standard 2.5 per cent. veal-broth agar, made by the addition of 0.5 per cent. sodium chloride and 1 per cent. peptone.

After adjusting the hydrogen-ion concentration to 7.8 by the phenol-red scale, which allows for a possible reduction of 0.2 from heating, the medium is tubed, autoclaved as above, and slanted. When the slants have solidified, the usual cotton plug is removed and replaced by a sterile rubber stopper to preserve the moisture of condensation.

In the preparation of this medium care should be taken not to add too much of the brain-bouillon, as the gonococcus will not grow

well upon a medium containing too much of it. Should the bouillon when filtered be thick and turbid, it is best to add a smaller amount of it to the agar. If this precaution is carried out, the pH is correctly adjusted, and there is sufficient moisture in the tube the gonococcus will grow luxuriantly upon it. If the growth is scanty, it is because the brain bouillon is too concentrated. In this event it is simply necessary to use a smaller quantity of the bouillon, or to add more agar if the medium has been completed.

The brain agar medium is now on the market in a dehydrated form. In the preparation of this it is only necessary to dissolve the powder in the required amount of water by boiling and to sterilize in the autoclave. Either of these media seem well suited for growing all of the bacteria that heretofore have been considered to require medium containing blood-serum or like enrichment.

As marketed, this medium contains enough fermentable carbohydrates to interfere to some extent with fermentation experiments. To overcome this, the producers also have prepared a medium from which these carbohydrates have been removed.

The makers of this dehydrated medium[1] also have devised a modification of the writer's medium, called "brain, heart agar," for use as a liquid culture-medium. In it the gonococcus grows luxuriantly.

Together these media greatly simplify gonococcus culture, and through this simplification should greatly stimulate further study of this most interesting bacterium.

INFLUENCES OF CHANGES IN ALKALINITY

Regarding the pecularities of the gonococcus in culture, the most striking, and perhaps the most important from a clinical standpoint, is its rather fixed habits regarding even slight changes in reaction of the culture-medium. It grows best at a hydrogen-ion concentration of from 7.3 to 7.6, which, unfortunately, happens

[1] The Digestive Ferments Co., Detroit, Michigan.

to be the rather constant range of the secretions of the normal urethra.

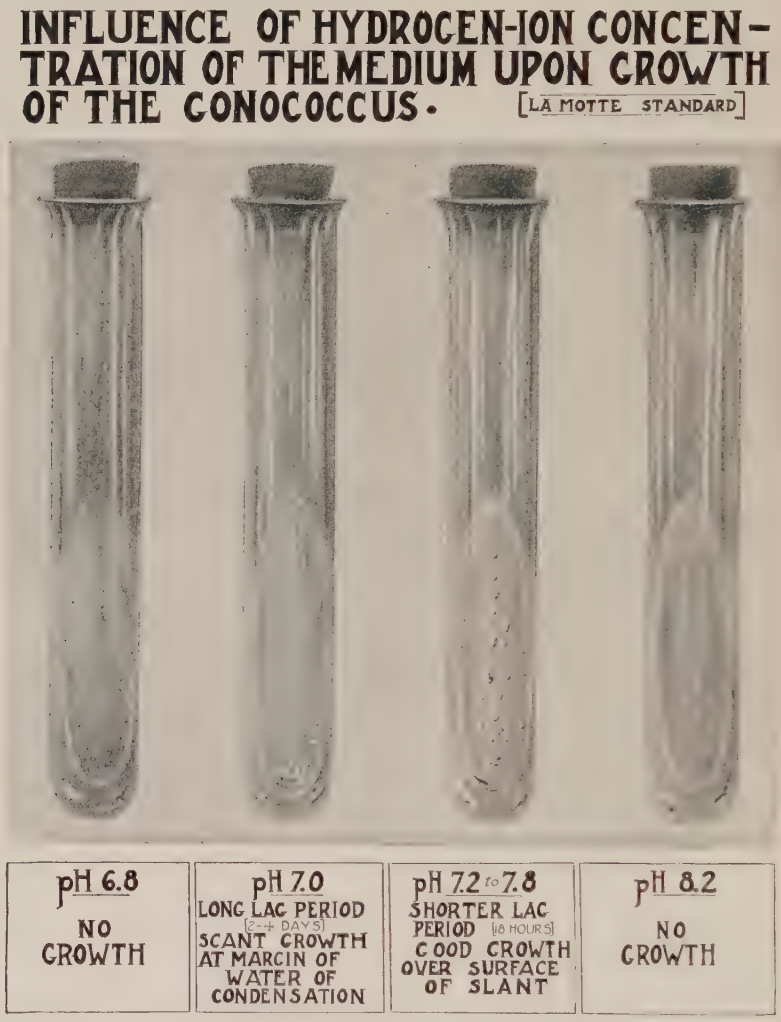

INFLUENCE OF HYDROGEN-ION CONCENTRATION OF THE MEDIUM UPON GROWTH OF THE GONOCOCCUS.
[LA MOTTE STANDARD]
pH 6.8
NO GROWTH
pH 7.0
LONG LAG PERIOD [2-+ DAYS]
SCANT GROWTH AT MARGIN OF WATER OF CONDENSATION
pH 7.2 to 7.8
SHORTER LAG PERIOD [18 HOURS]
GOOD GROWTH OVER SURFACE OF SLANT
pH 8.2
NO GROWTH

Fig. 13.

If we place the germ upon an albuminous medium with a pH of 6.8 or 7.0, we shall note a constant change in its life cycle. There will be a greatly prolonged lag-period, which may be four or five days. There will be a correspondingly long period of via-

bility, and, when the period of autolysis sets in, we shall find that it differs from that of the higher pH ranges and resembles that seen on cornstarch agar. If stained during this autolytic stage, it will be seen that the destruction of most of the bacteria has proceeded to a stage wherein they only faintly take the stain. In every field of these "shadow-forms" will be seen a small number of rather large, very deeply staining gonococci. It is as though, being compelled to struggle against slightly adverse conditions from the start, this survival of the fittest produced a hardier "strain" of germs.

If now we increase the pH, we shall find that we shorten the lag-period as well as the period of viability, and we shall soon fail to produce these more deeply staining elements. When autolysis sets in there are no exceptions, all are "shadow-forms." As we reach the pH ranges between 7.3 and 7.7, we encounter our shortest life cycle. The impression that one gets under these latter conditions is that they are so ideal, and the food so good, that the germs have all gorged themselves and died without developing in their community the hardier members that we saw in the lower pH range. Above a pH of 8.0 we seldom get any growth whatever. In fact, above 8.0 the gonococcus is dissolved, as a rule, after a few hours of incubation.

INFLUENCES OF CHANGES IN TEMPERATURE

In common with other members of the profession, the writer was taught that success in growing the gonococcus upon good medium from urethral pus was dependent upon the distance between the patient and the incubator. One does not have to read very far into the literature upon the subject before he is met with the statement that "the gonococcus is an extremely delicate germ which must be immediately incubated in order to grow." Having obtained cultures upon many occasions at the hospital, and carried them in his pocket for a number of hours,

only to find that they grew luxuriantly when incubated, the writer began to suspect that there might be something wrong with this teaching. With the help of Drs. F. S. Schofield and L. E. Viteri, he carried out some tests to see just what temperature indignities the germ would stand between the times it was obtained and incubated. Briefly stated, it will survive upon good medium after several days at room-temperature, twenty-four hours in an ice-box, and one-half hour in a water bath at 45° C. In subcultures it will survive 46° C.

We have been so accustomed to the thought that the gonococcus died quickly at 41° C., that its survival at its most delicate stage, immediately after culture, after a temperature so high,

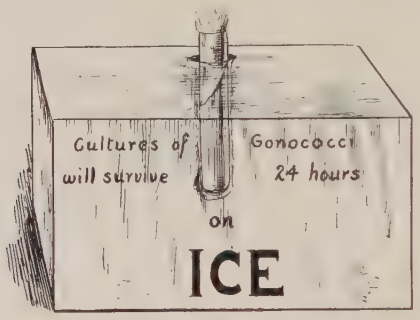


Fig. 14.

comes as a distinct surprise. Surviving in its unnatural environment, the test-tube, such a high temperature as 113° F. makes one question the likelihood of producing a cure of the disease, through temperature alone, when it is in its natural habitat, the urethral mucosa.

Surely a germ that will stand these things is not so delicate as to require much bacteriological skill before one can experiment with it. The calf's-brain agar can be made by anyone and anywhere, and if he is not skilled in hydrogen-ion determinations, he can send about 20 c.c. of his completed medium to one who is and quickly learn just how much sodium hydroxid solution he must add to the

bulk to reach a pH of 7.8, which allows for a reduction of 0.2 in the final sterilization. This can be obviated by using the dehydrated medium, wherein the pH has been adjusted and needs no further attention.

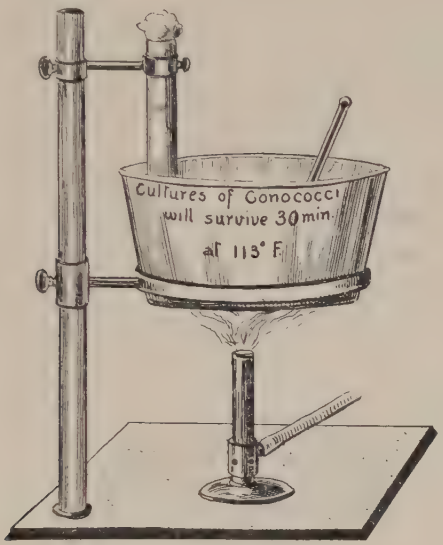


Fig. 15.

It might be added that there is no advantage whatever in heating the top of the test-tube to reduce the oxygen tension, as the gonococcus grows equally well, if not better, at normal atmospheric pressure.

STRAINS OF GONOCOCCI

While Torrey has described a large number of strains of gonococci, many other investigators have found it impossible to demonstrate such sufficiently fixed points of difference between gonococci from various sources as to call the matter scientifically settled. The more one studies the gonococcus from both the laboratory and clinical standpoints, the less confidence he will have in the existence of different strains, if we mean by "strains," that certain gonococci always differ in the same particulars from others. Cer-

tainly such laboratory data as we have in this regard are inconclusive, and our clinical data would seem to show that, while environmental factors may for a time cause minor temporary differences, such changes are neither lasting nor susceptible of laboratory demonstration.

Closely related to the question of different strains of gonococci is that of virulence. This, too, would seem, from our clinical observations, to be more a question of environment than of true differences in bacterial characteristics. On superficial analysis, the clinical behavior of different infected individuals would seem to suggest that there were different strains of gonococci and that gonococci did differ frequently in virulence. But, as one delves more deeply into these clinical manifestations, he is sure to come to the conviction that probably neither is the case, that the differences are inherent in the individuals and not in the bacteria.

That patients infected by the same "strain" of gonococci show just as wide variations in the clinical course of the disease as do those infected at different sources is a fact of easy demonstration. Equally simple is it to demonstrate that certain types of individuals, notably blonds, more commonly have those disease manifestations that we have associated with the thought of bacterial virulence. Also, as we pursue our studies of the clinical behavior of the disease in different patients, we shall find that those males, other than blonds, who would suggest virulence of infection either have had alcohol, sexual excitement, or much traumatic treatment during the incubation period or early stages of the disease. Further, it is common knowledge that those gonococci whose forebears have dwelt so long upon one mucous membrane that they occasion almost no signs of the disease in their host, will produce all types of gonorrhea when transplanted upon the mucous membranes of other individuals. From all of which it is probable that we have tried to blame the gonococcus for differences in this regard that, in reality, belonged to the patient or treatment.

Dismissing then, to a large degree, the thought that these seeming differences in virulence could be marshalled to support the contention that there are really marked strain differences in gonococci, let us see what the other clinical data can show to this end. We shall see in our discussion upon Immunity and Susceptibility, that it is extremely rare that an individual whose gonorrhea has become dormant can be superinfected by gonococci grown from his own urethral discharge. If such an individual goes on to cure, he repeatedly may be reinfected by this same "strain" of gonococci, but sooner or later one of these reinfections does not go on to cure. Under such circumstances he becomes a symptomless carrier. Being such, he may transfer the disease to another and later contract a pronounced gonorrheal attack from that other individual, though the bacteria were of his own "strain." Occasionally, he may repeatedly cohabit with an individual he has infected without superinfecting himself. In brief, we here see enacted by one "strain" of gonococci most of those clinical occurrences that have made us suspect that there truly were fixed and constant differences between gonococci from different sources.

There is another clinical fact that seemingly adds strong argument to the strain theory. An individual, having a dormant gonococcal infection, almost always can be superinfected with gonococci from another individual in whose infection he had no part. This, however, probably does not differ largely, if at all, from the fact that his own "strain" can do the same thing if transplanted to another, as noted above.

Viewing the question in its entirety, it would seem that what we have viewed as evidence that there were really different strains of gonococci is far from conclusive. That environment can bring about certain temporary changes in the germ is obvious, but it seems equally obvious that a change in environment can as easily obliterate these differences and make the micro-organism revert to its former condition.

Searching for a reason for these temporary changes that apparently are due to environment, perhaps our simplest explanation is a biochemical one. In the chapter upon Pathology, it shall be seen that the function of phagocytosis is practically confined to the epithelial lining and the lumen of the urethra, that whatever there is of an opsonic factor is almost a surface one. It, therefore, is probable that there is developed a temporary biochemical change, which causes one's own "strain" to be enveloped immediately by polymorphonuclear leukocytes before they can penetrate the mucosa which they must do to superinfect. And, though there is developed at times a mucosal desensitization to the toxins of a particular group of gonococci, this, too, will be lost should these bacteria be reacquired after being changed by growth upon another human mucous membrane.

Thus the term "strain," as applied to the gonococcus. seems not to carry the full meaning that it does when applied to some other bacteria, and, while we shall continue to use it as the briefest way to give individuality to gonococci as to source, such an use does not imply any other fixed differences.

THE PRODUCTS OF GONOCOCCAL DEATH

For a number of very important reasons it is well for us to know something about the poisons produced by this germ. They have a very direct relation to our understanding of many seemingly contradictory features of gonorrhea in the male.

It is conceded that the gonococcus does not elaborate any extracellular poison; that its only toxin is contained within the bacterial cell. Being solely of the nature of an endocellular toxin (an endotoxin), it is obvious that the germ must be disintegrated before its poison can be liberated. Pathogenic germs which elaborate no exotoxin are not in themselves irritants during their stage of viability, so that it cannot be the presence of live gonococci in the urethra that creates an inflammatory reaction. Such

a tissue response can occur from the toxin alone, and this only can be liberated after the death of the germ. Consequently it is not the presence of, but the death of, the gonococcus that really produces the phenomena of the disease. This seemingly unimportant point must be borne constantly in mind for about it rotates much that is of the utmost importance.

These gonococcal toxins are really very strong poisons which, in fair dosage, quickly kill the smaller laboratory animals. Injected

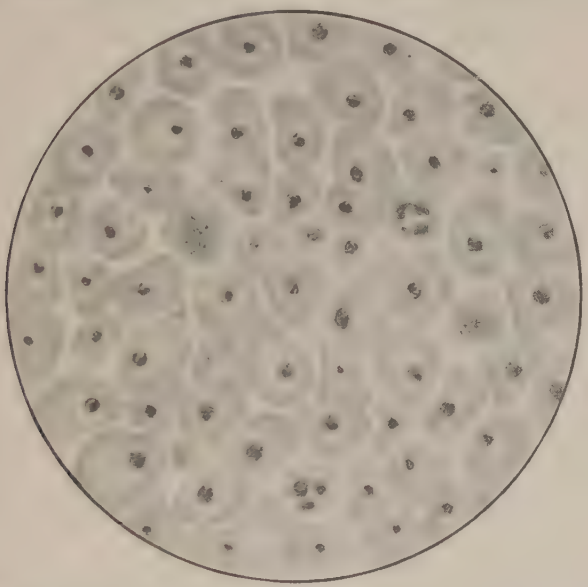


Fig. 16.—Platinum-loop scraping from the fossa navicularis prior to the injection of gonotoxin into the anterior urethra. No urethral discharge present.

in even moderate doses into individuals suffering from the disease they, at times, produce profound local and systemic reactions. As vaccines they have been much used and greatly abused. Their value in treatment is perhaps rather limited, although in some few selected cases they prove highly beneficial. It is not their proper use, but their abuse, that has done so much to discredit them.

If gonotoxin in great dilution be injected into the normal or the quiescent gonorrheal urethra, it will in from four to twelve

hours produce a purulent discharge. This discharge spontaneously subsides in about forty-eight hours. Not only will this gonotoxin produce a purulent response when injected into the urethra, but it will produce the same response time after time. In other words, the urethral mucosa seems not to possess the power easily to ac-

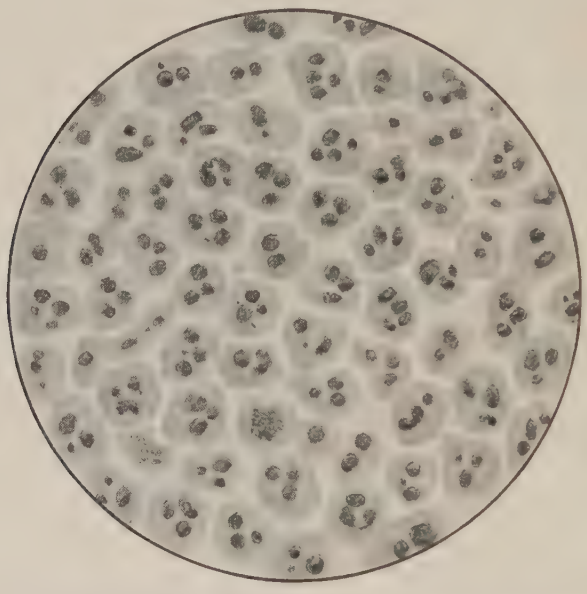


Fig. 17.—Non-bacterial urethral discharge four hours after the anterior urethral injection of gonotoxin.

custom itself to the irritating properties of these gonococcal products. It seems to become increasingly sensitive to them until very late in the disease.

THE GONOPHAGE

Perhaps the most interesting feature of gonococcal death is the liberation of a substance that is highly lethal to the gonococcus itself. This lethal principle has been extensively studied by Dr. F. S. Schofield and the writer (Alvarenga Prize Essay, 1926, Philadelphia College of Physicians), and found to fulfil all of the postulates put forth by d'Herelle regarding his "bacterio-

phage." The observations of Twort, in 1915, upon a "disease of bacteria," noticed in cultures upon agar plates made from lymph vaccines from the calf, were perhaps the first upon this interesting subject. The discovery of a similarly acting and apparently identical substance by d'Herelle, in 1917, and his extensive investigations brought the matter to general attention.

Without going too deeply into the subject, it can be said that all old cultures of the gonococcus, after autolysis is complete, contain what we have termed the "gonophage." This substance is found in the autolized growth itself, and is also absorbed by the solid culture-medium. When passed through a porcelain filter and added in extreme dilution (1 : 1,000,000 or greater) to suspensions of viable gonococci for an hour or longer, not only will it kill them but it will entirely dissolve them. This truly lytic principle resists a temperature of 65° C., and is not destroyed by 1:1000 solutions of mercuric chloride or 1:50 phenol. Gonophage can be transmitted indefinitely from culture to culture, and gonococci grown after exposure to it just short of lysis, when added to viable suspensions of the gonococcus, will prevent their successful culture.

The gonophage is absolutely specific in its action. It will not prevent the growth of any other bacteria against which it has been tried. Those closely allied Neisseriæ, the meningococcus and Micrococcus catarrhalis, are entirely unharmed by prolonged exposure to it. It, therefore, offers an apparently infallible means of differentiating the gonococcus from them. Successful culture following exposure to gonophage, would not occur if one were dealing with the gonococcus, whereas the others would grow luxuriantly. The gonococcus is unharmed by bacteriophages made from other bacteria that are lytic to their own types.

In his investigations of the bacteriophage, d'Herelle came to the conclusion that it was the true immunity substance, and that, because of its accumulation in the body of the infected individual, he recovered from the disease. In support of this belief he pre-

sented a long series of investigations made upon hemorrhagic septicemia of water buffalos. By the injection of his bacteriophagous principles he was able to protect these animals, as well

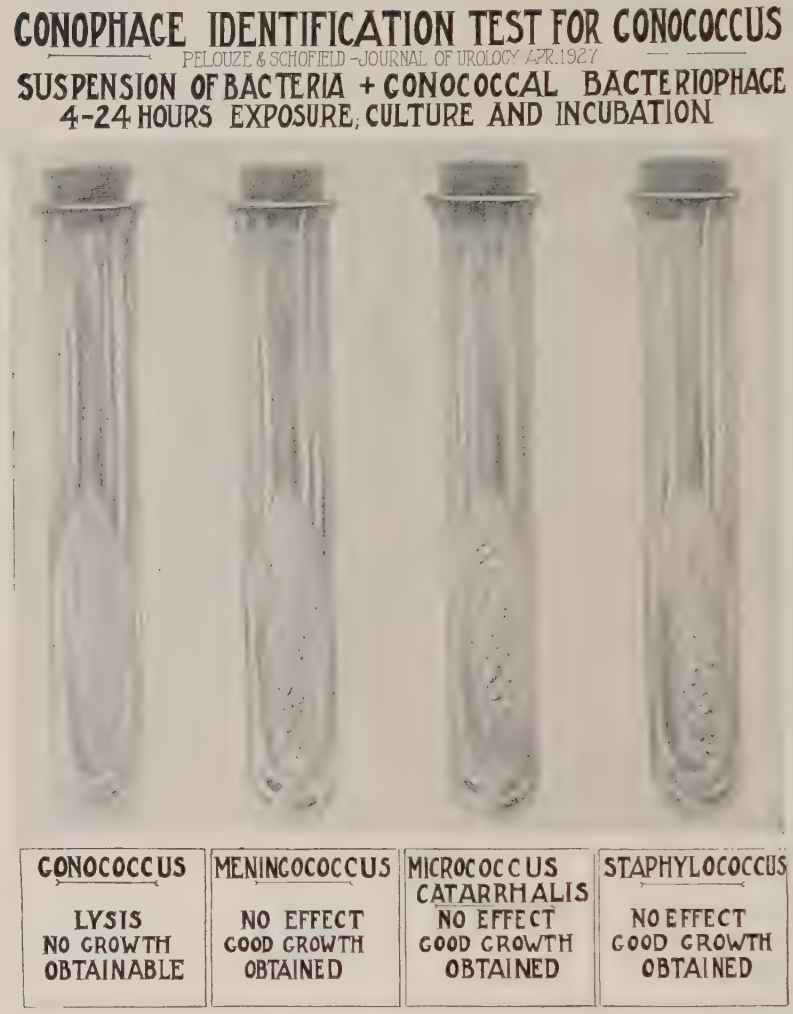


Fig. 18.

as fowls, afflicted with avian typhosis. His efforts upon human typhoid were not so brilliant. He, however, felt that they were sufficiently conclusive to bear out his contention.

Others have not been able to obtain equally good results, and the presence of large quantities of typhoid bacteriophage in the excreta of typhoid carriers would seem to raise a grave question as to the accuracy of his findings. Certain bacteria may eventually be able to develop great resistance to this lytic action, and it is possible that this has taken place in the particular strains inhabiting the intestinal tracts of the typhoid carriers studied. It was our experience to encounter this resistance to the lytic action of gonophage but twice in a very large number of experiments. Of these two "strains" of gonococci previously susceptible to the lytic action of gonophage, one developed complete resistance in the forty-sixth and the other in the fifty-ninth generation.

It is greatly regretted that d'Herelle's views have not proved universally correct, for they seem to offer a much-needed solution of the question of bacterial infections. Their clinical application by others has been decidedly disappointing. The clinical use of gonophage in our hands has brought out a number of interesting points, but we have not been able to produce with it anything comparable to immunity in gonorrhea. While, on the whole, the feeling has been engendered that it has some therapeutic value, cases have been encountered in which even systemic complications occurred while gonophage was being administered. This cannot be used, however, as a direct refutation of his contentions, for one hardly would expect to produce by such a substance an immunity to a disease against which there is no true immunity ever developed.

V. PATHOLOGY

A STUDY of the disease gonorrhea will show that from the standpoint of pathology it holds rather an unique position among diseases. In other diseased conditions the question of pathology has held a large part of the field, so that before one considered the disease itself he spent much time upon the real pathology of it. With gonorrhea it has been entirely different. Though the pathological picture has been a well-completed one for at least twenty-five years, it has been lost sight of almost entirely in our considerations. Nearly all of our American text-books upon gonorrhea make no more than casual mention of the pathological histology.

Such a state of affairs is hard to understand, for there is no disease of man that can vie with gonorrhea in the survival of things that should have disappeared from its literature. No group of writers has been followed longer than those who early wrote upon gonorrhea. Their writings have been handed down to us with little change for years. Indeed, it might be said, with much truth, that if our grandfathers, and possibly great-grandfathers, in medicine, could come back and read what we have to say regarding the disease today, they would feel much at home. They would be little surprised over what we have added to their store of knowledge. Our fathers probably would say that we have added little and lost much.

As one goes back among our American text-books upon gonorrhea he will find that some of those published about the year 1900 did devote some space to the microscopic pathology. Taylor's book, which probably saw its last edition at about that time, is an example of it. The matter then was rather a live subject, for it was shortly before this time that the Germans, notably Ernest

Finger, published so much upon it. Somewhat rapidly it disappeared from our considerations of the disease until today it generally does not get honorable mention.

In the French works a consideration of pathology has been revived recently, with a few errors, by Luys in his book on Gonorrhea and its Complications. This having been translated into English by Foerster, it became more easily available to us.

Considering the fact that but few of us who treat the disease know anything whatever regarding the minuter pathology of this important malady, there is, perhaps, little wonder that it is en-

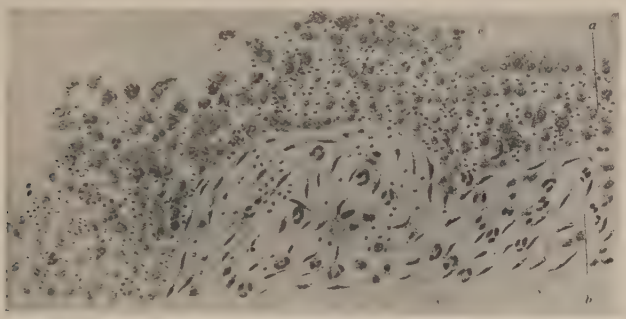


Fig. 19.—Copy of Finger's original illustration of the microscopic pathology of gonorrheal urethritis. The penetration of gonococci into the submucosa, as well as their extracellular location, is well shown (*b*). The shedding of the epithelial cells and the intracellular location of many of the gonococci among them is likewise well shown (*a*).

titled to first place among our most unskilfully treated diseases. A little serious thought upon the question would have caused us long ago to drop many of the distinctly crude and harmful modes of treatment that we have clung to so long after they were really archaic. One cannot thoughtfully view microscopic specimens of urethral gonorrhea and find any scientific justification for many of the things that are done and are called "treatment." Nor can one really say that the survival in America of the most vicious forms of therapeutic attack (the word "attack" is used advisedly) are altogether due to the absence of this pathological picture from our

literature. Things are as bad, if not worse, in Germany, France, and England, where this information has been more constantly included in the writings. The real fault seems to be that we have been too deeply concerned with what we saw clinically without trying to visualize just what happened in the tissues. We have blindly reached for that will-o-the-wisp cure, by doing things that could only increase our pathology, and then wondered why our success was so lacking in brilliancy.

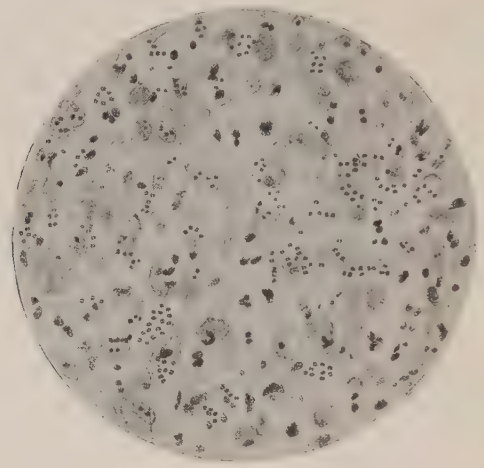


Fig. 20.—Copy of Finger's original illustration, showing a higher magnification of the mucous membrane from his foregoing illustration. In it can be seen more plainly the degree of phagocytic action present distal to the basement membrane.

The time has long been present when we should know not only what really occurs in the tissues when infected by the gonococcus, but should sensibly interpret these changes in terms of treatment indications. Until we do this there is but little hope of our greatly changing the present unattractive general picture.

For the present, however, let us consider the pathology alone, so that we may revert to it in our discussions regarding treatment. Since the gross pathology of many of the things that we have grown to consider parts of the disease, but which are largely the results of the disease, plus trauma, are so well known to us, it is

Fig. 21.—Drawing from a histological section of an acute gonorrheal urethra. It has been shown that the gonococci penetrated far below the basement membrane and that wherever there were gonococci in the deeper tissues there were polymorphonuclear leukocytes, so that the presence of one indicated the presence of the other. Such being the case it is interesting to note to what great depths gonococci penetrate. One cannot study such a section closely and find much to support the idea that our urethral injections of bactericides cure gonorrhea because of their direct bactericidal action.

perhaps of greatest value to occupy ourselves with the microscopic pathology of gonorrhea itself.

The weight of evidence apparently shows that the mode of extension of the disease is by the surface progression of gonococci and not subsurface transference. Though it is a disease of surface penetration, it is apparent that this occurs perpendicularly to the surface. The bacteria pass between the epithelial cells, into the submucosa, often as deeply as the trabeculæ of the corpus spongiosum. They never enter the protoplasm of the fixed tissue cells, but collect in groups of varying sizes in the intercellular spaces. The speed of this penetration is great, so that at the end of thirty-six hours they are well in the deeper submucosal spaces. Almost from the beginning of their penetration they evidently occasion a mild degree of inflammatory reaction from the minuter quantities of toxin liberated by the disintegration of the older bacteria. It is, however, only when great numbers of gonococci complete their life cycle and liberate their toxins that we see our real clinical responses.

If at the end of three days we study the tissue microscopically, we shall see very marked changes in it. Surface inspection shows that the most marked change is around the openings of the minute glandular offshoots, and that there may be islands of uninflamed membrane between these areas.

Study of the deeper tissues shows great capillary engorgement, with no change in the capillary wall, as a rule. There is an exudation of serum and a diapedesis of polymorphonuclear leukocytes into the surrounding tissues. These leukocytes accumulate in the vicinity of the bacterial colonies, so that the presence of one indicates the presence of the other. As the bacteria have passed into the glands of Littré and the crypts of Morgagni, and penetrated perpendicularly to their mucosal surfaces also, it is easy to see why there is greater pathology around their openings.

From the exuded serum, or the solution of their cement sub-

stance by gonococcal products, or both, results a loosening of the attachments of the epithelial cells. These are pushed widely apart and many of them are shed. The epithelium of the secreting surfaces in the depths of the glands is never affected by these pathological processes. The swelling of the crypt openings is often so great as to occlude them, and they are filled with purulent products.

As we pass from the deeper to the more superficial areas we find increasing numbers of leukocytes crowded between the fixed tissue cells. Beneath the submucosa we find leukocytes and gonococci lying side by side, but superficial to it we find fewer extracellular bacteria. In the urethral and glandular lumina practially all of them are within the leukocytes. This extremely interesting condition will be further discussed under the heading of Defensive Processes Against Gonorrhea.

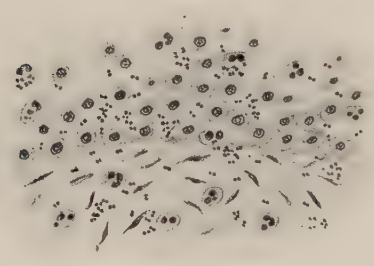


Fig. 22.—Acute stage of gonorrheal urethritis wherein the epithelial cells are shed.

Passing now to what has been called the "reparative stage" of the disease, we notice our greatest changes in the epithelial layers. Where we originally had but one or a few layers of cells, we find the denuded areas have been covered by many layers of closely packed epithelial cells. Toward the surface these have taken on squamous characteristics. In the more superficial of these keratin granules begin to make their appearance and, if the disease has been severe and prolonged, many of these cells have really keratinized.

If the perifollicular infiltration has subsided sufficiently to allow the gland to empty itself, the same epithelial changes occur as far down as the unchanged secreting surface. Should this liberation of purulent products not occur, the gland eventually is

obliterated by fibrosis. Occasionally these perifollicular areas undergo true abscess formation. Such abscesses may undergo resolution, or may rupture into the urethra or upon the skin surface. They are obviously more often the result of trauma than incident to gonorrhea itself, for they seldom occur where the urethra has not been subjected to instrumentation or great expanding pressures.

In some long-standing infections, and particularly in the presence of trauma, there is more or less extensive submucosal infiltration of round cells. Unless properly cared for these go on to fibrous tissue formation, with the subsequent contracting inherent to this type of cells, and eventuate in stricture formation.

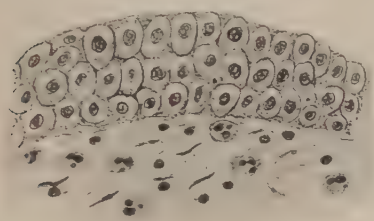


Fig. 23.—Early reparative stage of gonorrhea, wherein the usual single layer of columnar cells is replaced by a few or many layers.

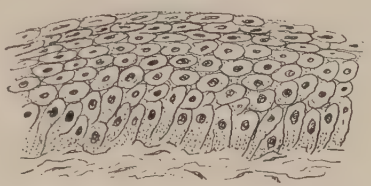


Fig. 24.—The later reparative stage, wherein the more superficial cells become squamous in character.

What has been said regarding the urethra applies to all of the other urogenital mucous surfaces. Except for the slight modifications as to susceptibility and penetration belonging to their types of epithelial covering, they differ only in structure and not in kind. The lymphangitis, lymphadenitis, phlebitis, and their results, which are occasionally seen in severe gonorrhea, together with more distant metastatic lesions, do not enter sufficiently into the peculiar features of urogenital gonorrhea to merit consideration here. They differ but little in pathology from like conditions in other infections.

VI. SUSCEPTIBILITY AND IMMUNITY

It is probable that every human urogenital tract is susceptible to infection by the gonococcus, and that the exceptions are only seeming ones. That individuals cohabit with those known to have gonorrhea without acquiring it is not really an evidence of any true lack of susceptibility to it. It is more an evidence of the absence of the gonococcus upon the free mucosal surface at the time of exposure. The habit of the germ to colonize in the smaller mucous channels, in association with the major tract in both the male and female, is generally the determining fact in the escape of either.

In such sexual contacts it is more common for the uninfected male to escape an infection harbored by the female than for the reverse to happen. A study of the surface bacteria in both sexes readily explains this, for in the female the gonococcus is commonly to be found only after some event that occasions the emptying of the smaller mucous structures. Women more commonly become what we might call "gonococcus carriers" than do men. Presenting no active symptoms late in the disease, they often are of the opinion that they have been cured until they have transferred the infection to another.

This tendency toward surface disappearance of all evidences of infection and its colonization in smaller channels in women has occasioned much misunderstanding in the lay mind. That gonorrhea in them can lie so dormant that the transference of the infection may not occur for a long period of time has led upon many occasions to suspicions of infidelity. A woman infected by a former husband may hold the disease in quiescence and infect a second husband many weeks or months after marriage. Such an

unfortunate circumstance is almost sure to lead to unjust suspicions. These infections are naturally more prone to follow a menstrual period with its marked increase of glandular secretion. The passive part played by many women during the sexual act does not occasion this glandular hypersecretion, and unless the act be performed immediately after menstruation the male may escape the infection for a long period of time.

The peculiar behavior of the disease under certain circumstances has given rise to the thought that there is such a thing as an immunity established in some individuals. These phases of the subject have received much attention, and it is the concensus of opinion that in some persons there is developed what seems to be a "strain immunity," which is not a true immunity. At the best, it is apparently a high degree of mucosal desensitization to the toxins of the patient's own "strain" of gonococci. The most common clinical demonstration of this is the frequency with which a marital gonorrhea subsides into inactivity in both parties. That the disease is still present is evidenced by the fact that either party can infect a third party, though they themselves seem to be free from the disease.

It was shown experimentally many years ago by Finger, Gohn, Jadassohn, and others that it was but rarely possible to cause evidences of superinfection of an individual by inoculation from cultures of his own "strain." On the other hand, it almost invariably was possible to superinfect him by cultures from another. From these artificial inoculations and our clinical observations it is possible to come to a number of conclusions upon the subject which aid us greatly in our understanding of the seeming vagaries of the disease.

As has been stated, marital gonorrhea may, after several recrudescences, become so latent that neither party is cognizant of its existence. If either cohabits with a third party, the disease may be transferred to that party and, should the third party have

gonorrhea, each can develop an acute attack from this extramarital "strain." The one acquiring the new "strain" can transfer it to his marital mate, who, though the victim of latent gonorrhea, will develop acute symptoms after forty-eight hours.

Further, if either the husband or wife with latent gonorrhea should marry again and infect the second mate, the transplantation of the "strain" upon the new soil frequently will cause a reappearance of active infection in the formerly latent gonorrheic. Occasionally the so-called "strain immunity" is such a decided strain-toxin desensitization that evidences of superinfection do not occur. Under such circumstances it is easy to see how much injustice could be done to the newly acquired mate. It has become so much the custom to convict without a hearing the one who first develops the symptoms of gonorrhea, that there is little hope for such an innocent one to escape censure. Circumstantial evidence is so overwhelming that we seldom go further back in the history. The development of gonorrhea shortly after marriage in one party, with its appearance some time later in the other, is hardly likely to place suspicion upon the latter where it possibly belongs.

In passing judgment upon such matters one cannot be too cautious. There is no event of life that gives a greater value to falsehood, and in which the real truth is harder to obtain. One may feel perfectly sure as to the source of infection and still be in error, for which reason he is safest who says least. The physician is neither judge nor jury, but one whose paramount duty is to prevent and cure disease, and he shines least when he diverges from such a course.

The influences of high temperatures in curing and in protecting from gonorrhea have received much attention. The proved fact, that the gonococcus will grow in culture after half an hour in a water-bath at 113° F., hardly gives strength to the thought that such an immunity, if it really exists, is due to temperature alone. It is more likely to be the result of febrile tissue changes. The

evidence in regard to the entire matter of such an effect of high body temperature is, however, very inconclusive and equally contradictory. It is our experience that the germ will stand far more in the urethral mucosa than in culture, and neither the fact that some artificial inoculations have failed, nor the fact that a few patients have gotten well during a febrile seizure, while hundreds of thousands have not, contribute materially to the discussion.

VII. THE INFLUENCES OF CELL TYPE UPON GONORRHEA

It was pointed out by Bumm, Finger, Jadassohn, and others many years ago that there were marked differences in cellular susceptibilities to gonococcal infections. They showed that the gonococcus found its natural habitat in urogenital mucous membranes covered with columnar cells, and that it rarely affected those covered with squamous cells. Their opinions were based upon the minutest microscopic studies of the lesions produced by the disease in man, and have met with no plausible contradictions.

If one studies closely the pathological histology of gonorrhea in the male urogenital tract, superimposes upon it the normal histological picture, and interprets both in the light of our common clinical experiences, it will be found that these earlier observations can be greatly extended. It will be seen that the disease follows rather fixed trends that are governed largely by the character of the surface epithelium. The importance of the knowledge thus gained is considerable, for it teaches us where the disease is most likely to create the greatest havoc and where it is likely to remain longest. It is a distinct help in our therapeutic attack upon the disease. Anatomical structure also adds controlling factors to modify the spread and duration of the disease.

So well do the histology, pathology, and clinical course of the infection blend into a moderately complete conception, that it is found possible to base upon it a number of rather definite statements.

Let us first enumerate the most important of what we might call our "rules of infection incidence and expectancy," and then see how they conform to our clinical experiences.

1. The susceptibility to and tenacity of gonorrheal infection of

the urogenital tissues bear a direct relation to the height of the superficial cells. The flatter the superficial cells, the harder they are to infect, and the more readily do they recover if infected.

2. Stratification of cells is definitely protective. The fewer the strata of susceptible cells, the deeper is the gonococcal penetration, and the greater and more prolonged is the inflammatory action.

3. The susceptibility of transitional epithelium bears an inverse relation to the dilatability of the structure it covers. This is equivalent to saying that the greater structures they line dilate the more resistant they are to infection and the more quickly they recover, if infected.

4. Long mucous channels of small caliber, though lined with the most susceptible types of cells, rarely will become infected through continuity of surface.

5. The tenacity of infection in all types of mucosæ bears a direct relation to the drainage possibilities of the surface involved.

6. If absolutely and permanently blocked, a small mucous crypt eventually will accomplish its own sterilization. In other words, to retain virulent infection for great periods, such crypts must be able to empty themselves from time to time.

In evaluating these statements we should bear in mind that there is a definite difference between true mucosal infection and mucosal responses to gonococcal toxins. With the exception of the general bladder wall and the upper urinary tract, all of these surfaces show, perhaps, an equal response to the effects of toxin. While the same response occurs during gonococcal infection, and serves to fog the picture somewhat, we are herein considering the infection itself and not the concomitant purulent responses, except in so far as they evidence persisting infection. The great clinical importance of the differences in cellular susceptibility is obvious. Let us, therefore, start at the external urinary meatus and see what can be expected of the various structures when infected by the gonococcus.

The expanse of almost a centimeter of squamous cells at the beginning of the canal should, and probably does, offer much protection against infection. These cells are so closely bound together that the gonococcus does not penetrate between them. For this reason they are immune to the infection, though the germ can grow along the layer of mucus covering them. Those individuals who have a fossa navicularis lined with columnar epithelium of course enjoy no such protection. They are possibly among those who present the marked meatal inflammation and edema occasionally seen, although most of these are due to trauma after the onset of symptoms or during the period of incubation.

Beyond the fossa navicularis the entire anterior urethra usually is lined with the most susceptible type of cells, columnar. These pass into the many crypts and glands that penetrate into the submucosa. Throughout this expanse of the urethra the gonococcus finds its ideal habitat. There is no such thing as a true immunity in these urethral areas lined with columnar cells, and the fewer the layers, the more surely does the gonococcus penetrate to the submucosa. Singularly enough, the secreting cells in the depths of the glandular structures are immune to the action of both the gonococcus and its toxins.

One is bound to marvel at the marked susceptibility of the columnar cells of the urethra to gonococcal infection. Their microscopical and staining characteristics seem not to differ from those of other columnar surfaces in the body, in which the germ will not grow. There is, however, one possible difference between them. It will be recalled that a largely constant feature of columnar surfaces is a so-called "cuticular layer" which forms a tiny protective film for these cells, sealing off their intercellular spaces much as the cell-bridges and cement substance seal those of squamous surfaces. Such a careful observer as Herzog was utterly unable to demonstrate anything comparable to a cuticular layer upon the columnar-lined areas of the urethra. If this is universally

true, their intercellular spaces enjoy no such protection against gonococcal penetration as would similar surfaces elsewhere in the body.

At the bulbo-membranous junction we usually encounter the first transitional epithelial cells. To one who gently and judiciously treats gonorrhea, it is evident that these cells by their nature, or due to the fact that they are in the tonic grasp of the cut-off muscle, offer a marked barrier to the extension of the disease into the posterior urethra. The present very high incidence of posterior urethritis is an index of the patient's conduct and the type of treatment. It is excessive, needless, and in no way controverts the above statement. Good conduct upon the patient's part, and the avoidance of foolish and overstrenuous forms of treatment upon the part of the physician quickly will reduce the text-book incidence of from 40 to 99 per cent. of such disease extension to the far more attractive figure of less than 15 per cent.

In those patients who present a membranous urethra lined with squamous cells, this resistance to extension must be greatly enhanced. On the other hand, a membranous urethra lined with columnar cells could offer no such protection. So it is quite possible that such differences of cell structure account for the anomaly of some cases of patients who, under the most ideal conditions, develop infection of the posterior urethra, particularly where this occurs within the first few days of the disease and in the absence of any treatment that could act as a cause.

The transitional epithelium of the posterior urethra is under great disadvantage. It has countless crypts studding its surface, as well as a number of columnar-celled channels emptying into it. Being between two sphincters its drainage is very poor; and yet, in most individuals, its free surface infection readily subsides. Despite its obvious vulnerability it has remarkable powers of freeing itself of gonococcal infection.

The lack of dilatability of the trigone gives us our best opportunity to compare the course of gonorrheal infection of such transi-

tional epithelium with that upon greatly dilating surfaces. It is rather firmly fixed to the subjacent structures, so that its cells undergo little change in contour or stratification, whereas those

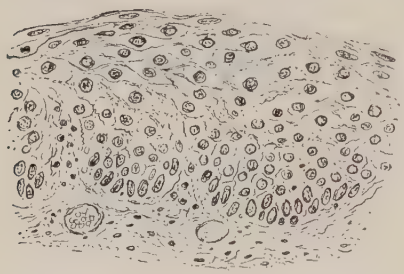


Fig. 25.—Squamous epithelium. This type of mucous membrane usually lines the fossa navicularis and, rarely, the membranous urethra. Owing to the inability of the gonococcus to penetrate between the superficial layers of cells it is practically immune to gonococcal infection.

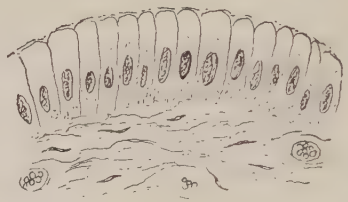


Fig. 26.—Columnar epithelium. This type of mucous membrane or modifications of it line the penile and bulbar urethra and all of the smaller mucous channels emptying into any portion of the urethra. The gonococcus easily finds its way through its intercellular spaces into its submucosa. It is the most susceptible type of membrane.

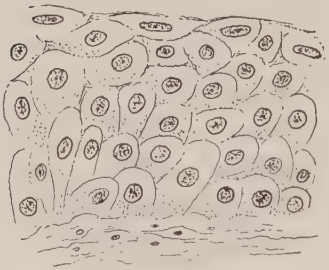


Fig. 27.

Fig. 28.

Figs. 27, 28.—Transitional epithelium. This type of cell lines the entire major tract above the membranous urethra. It exhibits varying degrees of susceptibility in different regions. In the kidney pelves and ureters it appears to have much native resistance. In the bladder, where it dilates until it becomes almost squamous in type, as in Fig. 28, it is practically immune unless changed by urinary retention or trauma.

upon the general bladder wall stretch until they are almost squamous in type. It has been observed cystoscopically many times that such infections stop with the trigone, and that the bladder wall only becomes infected in the presence of urinary stasis and trauma.

Unless these are continued it recovers within a few days. On the other hand, the undilating trigone readily becomes infected; but, despite the fact that it contains some glandular structures, it rather quickly rids itself of infection in most patients. The exceptions are probably those in which the trigonal glands are infected, although this has not been proved to be the case.

The ureteral mucosa not only has the protection afforded by repeated jets of urine from above downward and the sphincteric action of the ureteral orifice, but evidently enjoys much native resistance, for gonococcal ureteritis and pyelitis are apparently rare. From the recent studies upon ureteral reflux it is probable that these structures in a goodly number of individuals are subjected to a flood of gonococcus-laden urine from the bladder. Even more surely, most ureters either fail to become infected, or we are unable to recognize such infections clinically.

Regarding the protection against infection by continuity of surface, afforded by long, narrow channels, although lined with columnar cells, we find our best evidence in a close study of those etiological factors predisposing to infection of Cowper's glands, the epididymes, and the seminal vesicles. One practically never sees an infection of Cowper's glands in the absence of stricture of the anterior urethra or pin-point external urinary meatus, unless the patient has been given urethral injections or irrigations at high pressure. From this it is obvious that such a complication is due to the mechanical transference of the infecting agent and not by continuity of surface. A very close study of the events immediately preceding the onset of epididymitis usually will show that the patient has been subjected to great activity, intravesical irrigations, or some such factor that could mechanically force the infection into these structures.

Such are what might be called the infection incidence and expectancy inherent in the various types of cells in the male urogenital tract. The more closely one studies the rather fixed habits

of the gonococcus in culture and in the tissues, the more impressed he will be that we often have wandered very far afield in our interpretations of the many misleading features of the disease it produces. The more gently the physician treats the disease, the greater will become his respect for the inherent protective powers of the tissues themselves.

While cell shape and stratification have been stressed, it is possible that they are only secondary factors in the varying degrees of susceptibility. If we view the entire field of susceptible tissues in both the male and female, we get the impression that the more probable controlling factor rests in the varying degrees of protoplasmic activity of the given cells. In the male and female urogenital tracts the areas wherein the protoplasmic activity should be greatest show the most marked susceptibility to these infections. Not only is this the case, but events that tend to increase this activity tend to accentuate the clinical evidences of the disease. In other words, "hyperphysiology" of the infected mucous membranes produces great increase in the clinical manifestations. This is brought out very clearly in the female as the result of the "hyperphysiological" cellular condition concomitant with menstruation. The probable increase in cellular activity during sexual excitement in both sexes engenders like responses. The poorly understood action of alcohol upon gonorrhea may be due to the same causes.

It almost would seem that the busier the given mucosa is with its physiological functions, the less time it has to protect itself from the gonococcus. While the true secreting cells in the depths of urethral glands offer a seeming exception in this regard, the entire question opens up a decidedly interesting field for study. Whatever quality of defense it is that these susceptible tissues need, it is further reduced in them during periods of increased function. It is never absent in similar but immune mucous membranes in the same individuals. To know just what it is would be rather valuable knowledge for us to obtain.

VIII. DEFENSIVE PROCESSES AGAINST GONORRHEA

In our considerations of gonorrhea but scant attention has been paid to the urethral and perhaps systemic processes whereby the disease eventually is cured. Our belief that we some day shall find that marvelous penetrating germicide that will go down into the depths of the urethral mucosa and kill those deeper-lying gonococci has blinded us. That wide-spread belief, held by our grandfathers, and fostered by those who want to sell us the germicides, has long outlived its hope of fulfilment. To retain it longer would arouse a suspicion that, as a profession, we are somewhat gullible, to say the least.

That we are not likely to find such a germicide must be evident to us all when we view the entire picture of the pathology and our experiences in the use of these substances. In our clinical fields we have taken unto ourselves and our germicides credit that belongs to the body. We have somewhat conceitedly thought that we cured gonorrhea, whereas we have only helped the individual to cure his own gonorrhea by stimulating his curative processes.

Such being the case, it is obvious that we should do better to study more closely the patient's curative processes than to spend countless time in looking for that ideal chemical germicide that probably is not to be and is not needed. To one who disentangles himself from germicidal dreams, and views the disease from the broader plain that our accumulated data justifies, there opens up a larger field for thought. This is a field in which one must tread carefully, lest he magnify the value of a particular body process because its study fascinates, and minimize another because it does not allure him.

To accentuate the value of such studies, let us consider some of the evidence we have that gonorrhea is really cured by the patient and not by our chemical germicides as such.

To begin with, a large percentage of those afflicted with gonorrhea would get well without any treatment whatever, provided they avoided sexual excitement and alcohol.

Secondly, it can be stated almost as an axiom, and with little fear of successful clinical contradiction, that the greater the germicidal and supposed penetrating power of a given chemical, the less real good it does in gonorrhea.

Thirdly, any form of treatment that in any way devitalizes the urethral mucosa tends to perpetuate the disease no matter what germicide is used locally.

Fourthly, as will be seen under the discussion of treatment, avoidance of all of these things and the substitution of real gentleness as to the strength of the substances used, as well as the method of their use, makes it a mild disease with hardly any complications, and generally of but brief duration.

For these and many other equally striking reasons it must be obvious that the credit for cure belongs to the patient, and that the doctor's part is to pattern his treatment so as really to aid the patient's own curative processes rather than to aim directly at slaying the gonococci.

Of the minuter features of the processes whereby the body is enabled to cure itself of this infection, there is much to be learned. We have done little toward applying to gonorrhea the knowledge obtained from the study of other bacterial infections, yet comparison will show that they have much in common with it. Indeed, much is to be learned by such comparison.

Viewing the defensive processes in gonorrhea in the light of our present knowledge, it will be seen that they readily lend themselves to consideration under three general headings, viz.:

Secreted and exuded fluids (to which we will give the perhaps questionable title of "tissue diarrhea"), phagocytosis, and antibody formation.

TISSUE FLUIDS

As a like process occurs in other mucous membranes as the result of infection by other pathogenic bacteria, it would seem that Nature's first curative response is the establishment of a "tissue diarrhea." In the urethra this pouring out of fluid is due not only to an increased activity of all of the glandular elements, but to an actual exudation of blood-serum from the engorged capillary network in the submucosa. It is probable, from the direction of its flow, that this great outpouring of fluids is intended to flush out the bacteria as well as the bacterial toxins, and prevent their systemic absorption. Were the toxins of the gonococcus as deadly as are those of diphtheria, this would be a salutory factor in gonorrhea. Such not being the case, it is probable that this flow of tissue fluids in gonorrhea is as much a misfortune as it is a help, for it tends to subtract from the supply in the body at large the particular substances that stimulate the real curative processes.

These increased quantities of urethral fluids have no bactericidal value, as the gonococcus can be cultured after prolonged immersion in them. They do not remove the deeper lying gonococci, and they decrease in quantity and almost entirely disappear long before the disease is cured. On the other hand, if we increase their flow by the use of hypertonic solutions in the urethra, we greatly exaggerate the clinical manifestations of the disease. Not only do we increase the amount of discharge, but we greatly prolong the disease, and if such hypertonic solutions are used for any great length of time they produce chronic gonorrhea. The idea, that it is the patient with the profuse urethral discharge who recovers soonest, is merely a mental impression and is not founded on very close observations. In the section upon the clinical course

of the disease it is shown that the first gestures toward cure are evidenced by a decrease in the flow of urethral fluids, and that the production of such a decrease is the aim of good treatment.

Perhaps the best we can say of this "diarrhea" is that it acts as a transporting agent for the leukocytes, and possibly aids them in their function of phagocytosis. In all further respects it is probably a misfortune. Even this favoring of the questionably valuable function of phagocytosis may be an equally unfortunate rôle.

PHAGOCYTOSIS

For many years the envelopment of the gonococcus by the polymorphonuclear leukocyte has been regarded as Nature's one grand contribution toward the cure of gonorrhea. This remarkable process has been emphasized until it has grown to be almost a fetish: an idol against which it were sacrilege to make disparaging comments. Let us try to determine the true status of phagocytosis in the general picture of the disease, and make sure that some long-established facts regarding it are not lost sight of. If it was really intended to be what we have thought it was, it should have been better planned, for it seems singularly ill-adapted to the work accredited to it.

In our discussion of the pathology it was pointed out that, though countless gonococci penetrated into the submucosa, phagocytosis rarely occurred there. It is our belief that in most infections it is the more deeply placed bacteria that prolong the disease, and surely gonorrhea offers no exception. Such being the case, if phagocytosis were a real curative agent, the leukocyte should devour the gonococcus wherever it finds it.

Referring to our consideration of the bacteriology of gonorrhea, we shall recall that the leukocytic cytase does not digest the gonococcus as it does most other germs. Not only does it fail to digest it but it fails to kill it, for the gonococcus will grow upon

artificial culture-medium just as well after as before it is thus enveloped. This is unquestionably evidenced by the fact that pus, showing no extracellular germ elements, will give hundreds of gonococcal colonies when cultured.

A further study of the subject shows us that usually far less than 10 per cent. of the leukocytes present are able to envelop the gonococcus. If all were able to do so, we should not see this small number crowded with germs while the others contained none. From a curative standpoint this is hardly promising.

After the leukocytes have penetrated the basement membrane of the mucosa in their transit to the urethral lumen, small numbers of them begin to show phagocytic activity, so that most of the germs in the interepithelial spaces are within leukocytes. Upon the free mucosal surface there are practically no extracellular bacteria. This is rather conclusive evidence that whatever of an opsonic nature there is, is contained in the epithelial fluids and not in the exuded blood-serum itself. As the gonococci are preserved within the leukocytes for longer periods than generally are required for their removal from the urethra, it would seem that one great function of phagocytosis is the mechanical conveyance of the germs from the seat of disease. Viewing this in the light of our knowledge of other bacterial infections one can raise a very definite question as to the real curative value of even such a limited function. If the body obtains its antibody stimulus from antigens in the shape of bacterial toxins, as we believe it does, and the leukocyte preserves the gonococcus and prevents it from liberating its endotoxin, it thereby denies us much of the antibody stimulus. It throws the greater part of such stimulation upon that far smaller number of gonococci that live and die in the submucosa. In other words, there are perhaps more reasons to believe that phagocytosis in gonorrhea is a detriment than there are to consider it an aid to recovery.

ANTIBODY FORMATION

There is no phase of the entire study of gonorrhea that merits more and yet has received less attention than have the body's own defensive processes. It is because of the disregard for these things that so many foolish and futile things have been done in the effort to solve the riddle of what is good treatment, and that so little headway has been made. The fact that the body's power to produce what we broadly call antibodies is—in the final analysis—the reason why we recover from such infections, is indelibly stamped across our knowledge of the disease. We cannot even superficially consider the outstanding facts without being compelled to admit that Nature does more than we, and that we have not always helped her as much as we could. In fact, many of the modes of treatment delay the cure.

There are certain facts in this regard that we should bear constantly in mind if we would study the subject intelligently. These may be enumerated briefly as follows:

1. Gonorrhea is a disease due to tissue penetration by the gonococcus.

2. The germs reach points that we admittedly do not reach with our germicidal substances.

3. The deeper-lying bacteria outlast the stage of exudation, and are not greatly affected by the process of phagocytosis.

4. Under ideal conditions recovery may occur without any treatment whatever.

It is difficult to understand why, in the face of these four outstanding facts, this infection has been viewed in such an entirely different light from other bacterial infections. In other infections the body immunity processes have been stressed and, though at times they have been found difficult to stimulate, they have not been lost sight of for a moment. Because gonorrhea seems to offer a few contradictions to the general understanding of this

body function and lends itself so readily to local attack, the first thought has been that of slaying the bacteria by chemical bactericides, and last, or generally not at all, has come the thought of what the patient's own tissues could do to aid in the battle. And, as the latter is of greater importance, the result has been correspondingly disappointing.

Going back in the history of gonorrhea we find a period in which the traditional rut was almost abandoned. A point was nearly reached where at least some respect was shown the body's rôle in curing itself. Then things did not turn out as it had been hoped they would from a therapeutic standpoint; the blame for failures was placed upon the patient, while credit for occasional success was assumed by the doctor. It was to be expected that the development of the theory of the action of bacterial vaccines would attract the attention of those interested in the treatment of gonorrhea, and make them cognizant of the fact that there was such a thing as antibody formation in this disease. It was, however, hardly to be expected that, having gotten so little real benefit from a decidedly haphazard and unscientific use of these vaccines, we should, in dropping them, lose sight of such an important protective function.

In gonorrhea this function does not differ greatly, if at all, from the process as we see it in other bacterial infections. Like most infections, gonorrhea has some pecularities that seem to be essentially its own, but the minuter features of antibody formation appear to differ more in degree than in kind. The closer study of these occurrences in the body at large, and in the mucous membranes affected, unquestionably holds forth a greater hope from a therapeutic standpoint than our searches in other fields, and it is hoped that more careful research will be indulged in to this end.

We already have accumulated a number of relevant facts regarding these processes and the things that influence them in

one way or another. So important are they that it would be well to enumerate them:

1. Practically all individuals have the power to generate gonococcal antisubstances.

2. The readiness with which this function responds to the stimulus of infection differs in different individuals.

3. It is rather slowly developed in all and decidedly so in some, though general physique has but little influence upon it, as a rule.

4. Blonds, as a class, are extremely tardy in this regard.

5. At its best it never reaches true immunity.

6. It is a highly selective process in which antibodies are formed only for the particular "strain" involved.

7. Under certain conditions it will develop sufficiently to eradicate the infection.

8. In repeated infections by the same "strain" there results either an antibody balance or a local toxin desensitization, which makes it possible for the germ to remain viable for long periods without the other evidences of infection. In other words, the patient becomes a "carrier."

9. It renders superinfection with the same "strain" almost impossible, but it does not reduce the probability of a second, or greatly reduce the possibility of a third subsequent infection by the same "strain."

10. It offers no protection against heterologous superinfection or subsequent infection by another "strain."

11. It is probably the most delicately balanced antibody process of which we have knowledge.

12. It can be delayed or practically obliterated with the utmost ease.

13. It is commonly augmented by the onset of such complications as epididymitis, and almost obliterated for a long time by the graver complications of a systemic character.

14. In this latter characteristic it accords with our experiences in the use of vaccines, in that overwhelming quantities of antigenic substances check antibody formation.

15. On the other hand, the tardiness of the process is probably largely due to the usual, extremely limited absorption of antigenic substances as was pointed out in our consideration of phagocytosis.

16. Therefore, in the absence of distant foci, it is dependent upon the absorption of stimulating substances from the mucosa involved, and anything that retards this absorption retards the body responses.

17. Consequently, like other immunity processes, it is a body process, and not an essentially local one.

18. Its result is the formation of substances that range from the feeblest inhibitors of gonococcal proliferation through the various gradations to more or less rapid gonococcicidal action; from bacteriostasis to bacteriolysis.

19. Once having been started, it progressively and increasingly continues, unless retarded or checked by some one or several of the untoward events that so easily upset it.

20. If repeatedly retarded by such events, it less easily recovers its progressive course, so that chronicity of infection is the result.

21. Contrary to the general impression, articles of diet, other than alcohol, have no discernible influence upon it.

22. Alcohol has a very definite influence in retarding or checking the process of gonorrheal antibody formation. (The reputed, but poorly-authenticated cures of gonorrhea during prolonged alcoholic debauches, would suggest the wisdom of a closer study of alcohol's effects. If such cures do occur they are probably due to the checking of phagocytosis, with the consequent liberation and absorption of larger quantities of antigenic substances than occur when phagocytosis is not interfered with.)

23. Anything that in any way traumatizes or devitalizes the affected mucous membranes checks antibody formation and retards cure.

24. The same is true of the tissue processes that take place during sexual excitement, with or without coitus, as well as those that occur during menstruation.

25. Nocturnal erections or emissions influence it little, if at all, unless the seminal vesicle is infected.

IX. MODES OF INFECTION

Gonorrheal urethritis in the male is practically always the result of sexual contact with one having the disease. While the possibility of extrasexual infection of the male urethra must be admitted, the physician is hardly likely to see such a case in a very long lifetime. He will hear much of it from his patients on their first visits, but, if he adopts a tactful and sympathetic and not a holier-than-thou attitude toward them, he will find that the patient soon will remove the mystery from the source of infection as he becomes better acquainted with him. The author has looked for a number of years for such an accidental infection in the male, as well as a true recurrence of gonorrhea from an attack experienced a number of years before which had given no signs of its presence during the intervening time. Patients have denied recent sexual contact many times to throw such an air of mystery about the source of their disease. Each sounds so genuine, that one would be led to believe that at last he had a true case of accidental infection or late recurrence. If he at some future visit takes the time to tell the patient of some recent imaginary sexual lapse of his own, he will find the patient will become both confidential and boastful, and shatter the mystery as to the source of his infection. Nor will he later resent the method by which the truth was obtained. He readily will accept the physician's later statement that his own conduct has been above reproach and that the story told was for the result obtained, and will be amused when disillusioned, that he so easily could have been fooled. A married man who has indulged in illicit sexual intercourse, and practically all of these weird stories are told by married men or boys, is very loath to confess the real cause of his infection.

He feels at ease only in company of his own kind, and it is only when he believes that his doctor really could condone his conduct that he unburdens his mind. It is interesting to see the psychological change in these individuals when their doctor raises the curtain upon his own supposed "moral turpitude." A strong bond of friendship at once is engendered, upon the altar of which the patient offers his innermost secrets. So apparent is the relief and comfort thus brought him, that it often seems cruel to let him even suspect that he has been tricked.

X. INCUBATION

For many years it has been our custom to explain away that period elapsing between the acquisition and the clinical evidence of gonorrhea, by saying that it was the period required for the transit and tissue penetration of the gonococcus. As we study more closely the data upon this phase of the disease it is easy to see that this only partially explains. It was shown by Finger many years ago that tissue penetration was practically complete at the end of thirty-six hours, and yet we must wait usually another thirty-six hours for the clinical manifestations.

Turning to a consideration of the life-cycle of the gonococcus, and the fact that its toxin is endocellular, it is obvious that there is really more to this period of incubation than we have thought. Not only must the germ penetrate, but it must complete its life-cycle and liberate its endotoxin, after which some hours elapse for the generation of the true tissue-responses. Consequently our incubation period comprises the time required for transit along the urethral surface, penetration into the deeper mucosal layers, completion of the life-cycle of a sufficiently large number of gonococci to liberate their endotoxin, as well as the time required for a toxin tissue-response. Evidently the time required for the bacteria to spread along the urethra is not much of a factor, as the incubation period in the male does not differ from that in the female where the gonococcus frequently is engrafted directly upon columnar epithelium.

With a bacterium so susceptible to time changes in its life-cycle, it is but natural that cases should occur wherein the clinical evidences of the disease were delayed far beyond a necessary minimum of time. Culturally almost any variation beyond this minimum can be produced. The "lag-period" can be greatly prolonged

by slightly adverse circumstances, as can the period preceding autolysis. It is clinically evident that, even with the same "strain" of bacteria, different urethræ show the widest range of reactions as to time and virulence. So pronounced is this that it is obvious that gonorrhea is really an individual disease, and as differ the food and environment of the germ, so differ the time and degree of the tissue responses.

From much clinical observation, as well as many artificial inoculations reported by Finger and others, it is evident that we must consider that our minimum incubation time in gonorrhea is greater than forty-eight hours. It is more often seventy-two hours or longer. Urethral discharges occurring at shorter periods than forty-eight hours are not new infections. Consequently we are safe in stating that no discharge appearing within forty-eight hours is due to a newly acquired gonorrhea, but is a toxin response from the patient's older latent infection. We must not lose sight of the fact that it may also be from a sexual contact, shortly antedating the suspected one, and that the disease may have been given, and not gotten, on the occasion of the latter.

While clinically the usual period of incubation is from three to five days, one occasionally sees patients who have developed an urethral discharge one or more weeks after exposure. Such delayed periods of incubation are probably more apparent than real. It is probable the disease was present in such a mild form that the patient was not aware of it until he indulged in something that acted as an exciting factor. This is well illustrated by the case of a medical student who, six weeks after a week's wild sexual orgy, developed a profuse gonorrheal discharge the morning after the consumption of a large quantity of alcoholic drink, though he had had no sexual exposure in the meantime.

Another case in point is one of two young men exposed to the same source of infection. One developed a florid gonorrhea promptly, but the other showed no signs of the disease. Smears

of the urethral mucus of the latter were negative for gonococci and pus for a week after the former had developed the disease. At this time the one hitherto showing no symptoms consumed a fair quantity of wine, and upon the following morning had a purulent discharge containing countless intracellular gonococci.

From such occurrences it is obvious that much care should be taken in proving that infection does not exist in the increasing number of individuals who consult doctors in fear that they may have acquired the disease. It is patent that alcohol, for example, can at times reveal infections that are a decided menace because of their latency.

XI. THE CAUSES OF SYMPTOMS

The closer study of the conditions underlying the occurrence of the purulent responses of gonorrhea brings out many things of interest and value in our understanding of the disease. We have overlooked a number of things in this regard, and have accepted too fully the belief that the recrudescences of these objective symptoms after periods of comparative quiescence were due to reinfections as the result of the emptying of retained bacteria into the urethral canal. That this cannot be true is amply borne out by the time required for the appearance of the urethral discharge, as well as the duration of it following the several causal factors.

It was pointed out in our consideration of the products of gonococcal disintegration that the urethral discharge was due to the irritative action of the endocellular toxins. In order to liberate these toxins the gonococcus must complete its life-cycle, and its cell wall must rupture. In the pathological picture of the disease it is apparent that there occur many opportunities for the storing up of these poisons, as well as their subsequent evacuation into the urethral lumen. The infection passes into such mucous channels as the glands of Littré, crypts of Morgagni, or prostatic follicles. Due to the mucosal swelling, their outlets become blocked so that the pus and bacteria in their depths disintegrate. These retained products should, therefore, be rich in gonotoxin and, if suddenly evacuated, should cause an increase in urethral discharge providing there is sufficient toxin present.

It is much in evidence that the urethra rarely becomes desensitized to gonotoxin during the first few months of the disease. In fact there is much reason to believe that it becomes increas-

ingly sensitized, so that very minute quantities of gonotoxin create responses almost if not quite equal to those of the larger quantities during the earlier quiescent periods of the disease.

Mucosal gonotoxin desensitization is solely a product of prolonged or repeated reinfections by the same "strain" of gonococci. Some individuals never develop it, and in some it appears to be developed, then lost, and possibly redeveloped. It is not effective against the toxins of another "strain."

Following the injection of gonotoxin into either the normal or the quiescent gonorrheal urethra there appears a profuse purulent discharge in from four to twelve hours. This discharge generally subsides by the end of forty-eight hours. Such a response agrees in every way with those seen so commonly as the result of untoward events during the course of the disease, and which we have always called reinfections. Against their being due to the liberation of viable gonococci into the urethral lumen, and reinfections therefrom, stand several things that have been sufficiently substantiated to be called "facts." It must not be forgotten that superinfection by one's own "strain" of gonococci is rarely possible, whereas the purulent responses in question practically always occur. Further, it has been repeatedly shown that, where superinfection was possible, there was a period of over forty-eight hours intervening between the inoculations and the appearance of discharge, and that the resultant superinfection differed little in its course, if at all, from the original infection. The discharge of which we speak usually occurs well within twelve hours of the event causing it and has subsided into complete or comparative inactivity before the discharge due to reinfection or superinfection could appear.

From the data available, as well as our common clinical observations, it is, therefore, obvious that those so-called "flare-ups," so commonly seen in the course of the disease as the result of alcohol, sexual excitement, or direct trauma to the urogenital tract, are

mucosal toxin-responses and not in any sense reinfections. The fact that gonococci can be demonstrated in such discharges does not disprove such a statement, for it is not to be supposed that all of the organisms in the retained pus were autolyzed, and the liberation of the viable ones would occasion their rapid multiplication in the better culture-medium.

There is abundant clinical evidence to show that repeated toxin-responses following periods of quiescence do much to upset the delicate immunity balance of the disease. They are the most potent factors tending toward chronicity.

One could indulge in much interesting speculation regarding the minuter tissue processes leading to these toxin responses as the result of the well-known clinical occurrences producing them. Those occurring as the result of the passage of urethral instruments too early in the disease, and the digital manipulation of a gonorrheal prostate or infected urethral follicle, can easily be attributed to pressure evacuation. On the other hand, those following sexual excitement are probably due to the increase of glandular activity physiological to this state. The responses following the ingestion of alcohol, however, are not so easily understood, and are well worthy of close study. They may be due to the supposed "wet mucosa" of alcohol and the secretory activity consequent thereto, or they could be the result of the reputed checking of phagocytosis due to alcohol in quantity and the consequent liberation of more gonotoxin.

The rôle of the repeated recrudescences in retarding cure is likewise a fertile field for speculation. In it one finds many apparent contradictions and much that mystifies. From the general picture of the disease, viewed in the light of our knowledge of immunity processes, it would appear that longevity of the infection was largely due to insufficient antigenic substances to stimulate the body's feeble immunity processes. Under such circumstances we would expect that such "flare-ups" would be of benefit, in that

they would cause increased antigen absorption. During the first few months of the disease they, however, have a definitely deleterious effect, whereas, in the presence of chronic gonococcal infections, such recrudescences are often not only beneficial, but are, at times, the determining factor in cure. Certainly we have much to learn regarding these seemingly contradictory functions of the body and the local tissues.

XII. THE SYMPTOMS OF ACUTE GONORRHEA

The subjective symptoms accompanying the early stages of gonorrheal urethritis exhibit the widest variations in different individuals. In some there are practically no early subjective symptoms, while in others there are great urethral discomfort, often amounting to pain, and the most intense burning during the passage of urine. Most patients, however, experience no great discomfort beyond a slight burning sensation along the urethra and itching at the meatus. In fact, the most pronounced subjective manifestations of the disease are commonly of a psychic nature, for few events of life make a greater mental impression.

So fixed and regular is the mental cycle during the course of gonorrhea that one wonders that the psychiatrists have not given it their attention. They could well have labeled it "psychosis gonorrhoica." Starting as an acute fright, it causes the victim to seek confirmation of his fears. Immediately following the positive verdict there is a brief period of vasomotor disturbance that at times eventuates in the unconsciousness of a fainting attack. Then a period of grave apprehension which, in the married, gives way to greatly accelerated cerebration wherein the mind quickly sorts over every known alibi to find the one most suited to the given case. Then a true inferiority complex wherein he feels himself unfit to associate with the opposite sex; an obsession of abject unworthiness. Gradually this abhorrence of femininity dwindles. The sound of a voice, the turn of an ankle, or the lure of a smile quicken the senses and turn the errant mentality in the paths that lead to normality.

A few patients experience a slight elevation of temperature accompanied by malaise. These are more often encountered in those patients who subject themselves to direct trauma or other

untoward influences just prior to the onset of the disease. The same is likewise true of meatal edema and other marked inflammatory occurrences, such as: phimosis, paraphimosis, and the early deep infiltrations of the corpus spongiosum, occasioning that most annoying of all early symptoms, chordee.

The amount and character of the urethral discharge vary as widely as do the subjective symptoms. There really is no such thing as a macroscopically characteristic gonorrheal discharge, though one commonly hears of it from those who do not use the microscope. The only real difference between a gonorrheal discharge and those occasioned by non-specific urethritis of the several types is that the former contains the gonococcus. Either can be mucoid, purulent, green, yellow or bloody, scanty or profuse.

The period of greatest discomfort of the early stages of gonorrhea seldom outlasts the first week. There then ensues a stage of comparative local comfort, except during erection. In favorable cases this improvement is gradual and continuous. In the less favorable cases the disease, usually later than the first week, extends to the posterior urethra. This in most patients is heralded by marked frequency of urination, vesical discomfort, and tenesmus. There is commonly a return of the burning, an increase in the amount of urethral discharge, and, at times, the passage of a few drops of blood from the meatus at the end of urination. This second period of great discomfort subsides after a few days and, if no further complications occur, the patient is not greatly annoyed by his subjective symptoms.

Among those patients who subject themselves to alcoholic or sexual excitement, who indulge in coitus, or to whom forcible urethral treatments are given during the early days of the infection, early involvement of the posterior urethra is not uncommon. Upon very rare occasions one encounters cases of gonorrhea in which the first subjective, as well as discoverable objective symptoms, are those due to involvement of the posterior urethra. Some such

cases are to be attributed to an uncured older infection, or to bungling methods of prophylaxis. Some are not to be explained by either of these.

One never should lose sight of the fact that, in a surprisingly large number of patients, infection of the posterior urethra occurs without occasioning the slightest discomfort. The urinary evidence of such disease extension is, at times, so fleeting that, unless studied at frequent intervals, it may escape notice. This is of great importance in view of the fact that the prostate gland seldom, if ever, escapes infection when the posterior urethra is involved. The possibility of considering these patients cured, when in reality they harbor gonococci in the prostate gland, accentuates the wisdom of investigating these structures in all patients prior to the discontinuance of treatment. Much of the gonorrhea in the world today is due to a lack of appreciation that the prostate can, and often does, harbor the gonococcus long after all visible and subjective evidences of infection have disappeared.

One of the surprising features of gonorrhea is the rarity with which marked infection of the prostate gland gives any discomfort to the patient. In conformity with the behavior of the gonococcus elsewhere one would expect such a poorly draining structure as this gland to occasion great discomfort and even elevation of temperature when acutely infected. Such, however, is not the case, as it is rather rare to hear much complaint from the patient regarding it.

THE TWO-GLASS TEST

Our simplest and most reliable means of following the course of the infection is observation of the character of the voided urine. To this end it has been the custom in routine work to make use of the two-glass test. Obviously this test is only of value during the active stages; its value ceases when the disease has reached marked latency. It is really strange how such a simple test can be so thoroughly confused in the medical mind as

this often is. The most common misconception in regard to it is to view the occurrence of a cloudy first glass and a clear second glass of urine as proof that the anterior urethra alone is the seat of infection. So commonly are such misinterpretations made that it will not be in any sense a waste of time to go over the matter briefly.

If the urinary bladder is full of clear urine, and the patient voids two ounces or more of urine into one glass and the balance into a second glass, he obviously will wash out any pus or shreds that may be in any portion of his urethra into the first glass so that the second glass will be clear. It would make no difference if it was a small quantity of pus or shreds in the posterior or in the anterior urethra; it would go into the first glass.

Should there be such a large amount of pus produced in the posterior urethra between urinations that it forced its way through the weaker sphincter at the vesical outlet back into the bladder, there would be no clear urine for a clear second glass. The first glass would contain the urethral pus in the already cloudy bladder urine, and the second would be slightly less cloudy from what pus passed into the bladder from the posterior urethra and that due to the trigonal infection. It is evident that the formation of pus by the trigonal mucosa quickly stops, so that it is usually a factor in only the first few days. The clouding of this second glass of urine after the subsidence of the trigonal suppuration would be entirely dependent upon there being sufficient pus formed in the posterior urethra between urinations to force the vesical sphincter. When this did not occur the urine would revert to the former condition, first glass cloudy and second glass clear, but would not in any sense prove that the posterior urethra was not infected. In other words, soiling of the second glass of voided urine is entirely a matter of the *quantity* of pus formed in the posterior urethra between urinations.

The degree of cloudiness is but an index of the amount of pus,

and the amount of pus is an index of the activity of the infection. Obviously, therefore, it is a simple matter to follow the progress of a given case if one can properly interpret the two-glass test. This will be further considered in the section on The Clinical Course of Gonorrhea, but it is well for us to remember certain peculiarities of this test and what they mean. To be of most value, the patient should have retained his urine for a sufficient period to allow of the accumulation of his average amount of pus, preferably for one and a half hours, or longer. In the presence of marked posterior irritation this, of course, cannot be done, but there should be some uniformity established regarding it. Interpretations based upon less than 2 ounces of voided urine for the first glass are usually worthless.

The degree of cloudiness or haziness is dependent upon perfectly obvious and easily elicited factors, and needs no comment. Beyond this, one has but to remember that the presence of shreds denotes either a subsiding acute condition, latency or chronicity, either of which is easily determined from the history of the case under study.

The purport of the various combinations observed in the study of the two-glass test can be briefly tabulated as follows:

First glass.	Second glass.	
Cloudy	Clear:	(*a*) Acute anterior urethritis.
		(*b*) Acute anterior urethritis with mild or subsiding posterior involvement.
Hazy	Clear:	(*a*) Mild acute or subacute anterior urethritis.
		(*b*) Mild acute or subacute anterior urethritis with mild posterior involvement.
Shreds	Clear:	(*a*) Subsiding anterior urethritis.
		(*b*) Subsiding anteroposterior urethritis.
		(*c*) Chronic urethritis, generally as the result of deeper foci of infection in the prostate or other associated small channels.
Cloudy	Cloudy:	(*a*) Acute anteroposterior urethritis.
		(*b*) Cystitis or upper-tract suppuration.
Cloudy	Hazy:	Subacute or mild anteroposterior urethritis.
Hazy	Hazy:	(*a*) Subacute or mild anteroposterior urethritis.
		(*b*) Bacteriuria.

First glass.	Second glass.
Clear	Cloudy: (*a*) Seminal fluid.
	(*b*) Contents of pus pocket.
	(*c*) Sedimented mucus, or phosphates from a poorly emptying bladder.
	(*d*) Slight terminal bleeding.

One should not forget the importance of ruling out cloudiness due to phosphates by the addition of acetic acid, or possibly urates by the application of heat. It is rare to see cloudiness in freshly voided urine as the result of other causes than those mentioned. In patients taking large quantities of balsamics it is not uncommon to see an increase in the cloudiness of the urine upon the addition of acetic acid.

To determine the presence or absence of mild or subsiding posterior urethritis in the presence of a clear second glass of urine it is at times necessary to copiously irrigate the anterior urethra to remove any contained pus or shreds, so that the first glass of urine voided contains only the substances washed from the posterior urethra by the voided urine.

There have been devised various additions to the two-glass test. Some of these use as many as seven glasses and are of questionable value. They are aimed at determining the presence of pus in such structures as the prostate and seminal vesicles. Judging of the presence of pus in secretions, themselves opaque, by the extent to which they render the urine opaque, has too large a margin of error to approach even fair accuracy. These secretions can be studied best under the microscope, by the use of which accuracy supplants much poor guesswork.

XIII. THE MICROSCOPIC INTERPRETATION OF URETHRAL DISCHARGES

The microscopic study of stained smears of the urethral discharges is of the greatest diagnostic value. Only by such a procedure can those discharges that are of gonococcal origin be differentiated from those that are not, for they have no constant macroscopic differences. In points of importance they differ so widely, however, as to make the neglect of microscopy the height of unfairness to the patient.

Throughout the years there has been much effort expended toward giving these studies a wider range of value, particularly in so far as the question of prognosis was concerned. Certain general impressions have been created that are not altogether in accord with the scientific facts. Particularly has this been evidenced in regard to what one might call the "phagocytic index" of such discharges, meaning the number of leukocytes per hundred that showed phagocytic activity. By some it has been urged that marked phagocytosis was evidence of a high degree of resistive power upon the part of the infected individual. In other words, the higher the "phagocytic index," the sooner the individual recovered from his infection. Just how such an idea, having so little foundation in fact, could have gained such wide credence it is hard to say. It was rather generally believed before Wright's work upon the opsonic index and more generally so since.

A close study of this interesting phenomenon shows the truth to be at wide variance with such a conception. There seems to be only one clinical occurrence to give support to such a view, and that one is rarely encountered and even then is inconstant. We shall see elsewhere that perhaps one individual out of about every 200 of those infected by the gonococcus is extremely tardy

in the development of any appreciable amount of curative response. Such an individual, it makes little difference what plan of treatment is used, continues to have a urethral discharge week after week. The clinical manifestations of his infection change very little in long periods of time. Singularly enough, these individuals at times will have a urethral discharge in which the gonococci are practically all outside of the leukocyte, in which there is little or no evidence of phagocytosis. Seen at such a time they

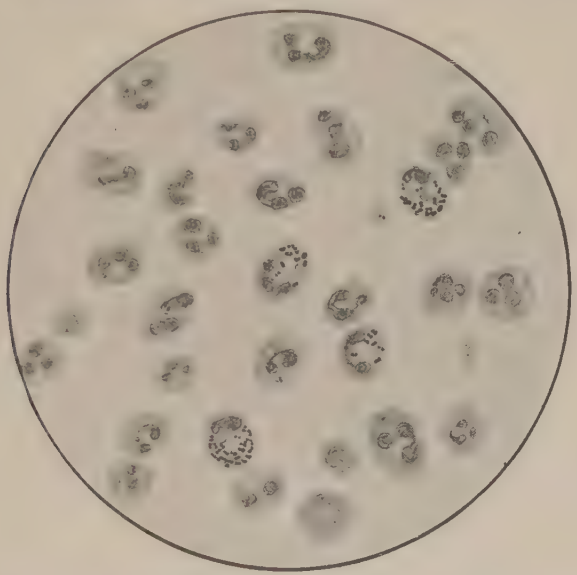


Fig. 29.—During the florid stage of the disease there are few, if any, epithelial cells in the discharge and the gonococci are usually all intracellular.

seem to offer good evidence of the accuracy of the belief previously mentioned. The extracellular location of their gonococci, however, is not constant, for the same individuals will show long periods wherein the phagocytic index is extremely high, and in whose discharge there seem to be no extracellular gonococci. Thomson has cited the complete absence of phagocytosis seen in three individuals with prolonged gonorrhea, two of whom had had energetic treatment with gonococcal vaccines. At first glance such

an observation would seem to be of great value, but the writer's experiences have not been such as to make him feel that isolated observations lend much toward the solution of the question. If continued over any length of time, the microscopic picture reverses itself too frequently.

Dr. L. A. Markley carried out for the writer a larger number of phagocytic-index counts on a number of patients. These were carried out from early in the disease on for an average of forty-eight

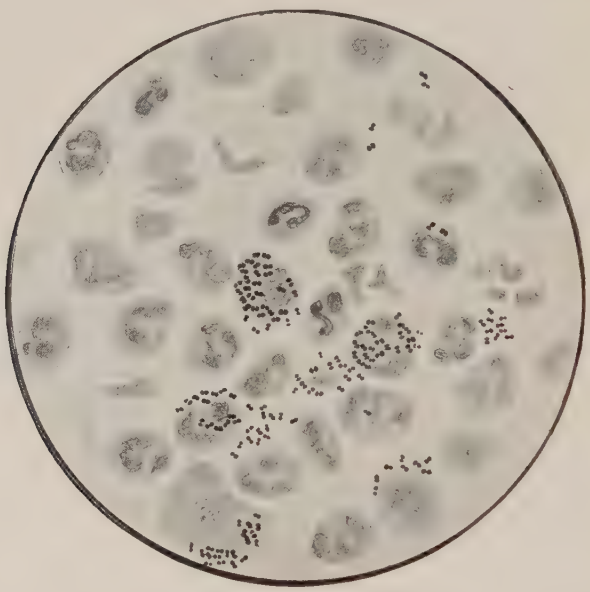


Fig. 30.—On the first day of a gonorrheal discharge it is common to find both intracellular and extracellular gonococci, as well as a few epithelial cells. The same picture is commonly seen in the subsiding stages of the disease.

days. From an analysis of his charts, upon which have been superimposed graphic charts of the urine trends, one is forced to the following conclusions:

1. The ratio between the intracellular and extracellular location of gonococci in urethral discharges varies too greatly to be of prognostic value.

2. Such high phagocytic indices occur so commonly in chronic

gonorrhea as to throw a grave doubt upon the function as a true therapeutic agent.

3. The phagocytic index depends upon the number of gonococci present, and as there are usually more in the early stages the index is usually higher.

4. There is no definite relation between the phagocytic index and the amount of urethral discharge, as a profuse discharge may contain comparatively few gonococci and a scanty one the reverse.

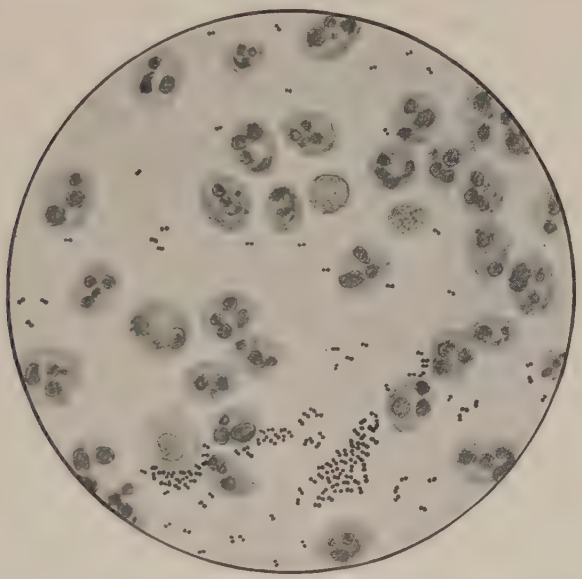


Fig. 31.—A urethral discharge showing all of the contained gonococci placed extracellularly. A stained smear taken from this same patient a few days later showed all of the bacteria within the leukocytes.

5. The clinical manifestations bear no fixed relation to the number of gonococci in the discharge; they are the results of individual factors, the varying responses to gonococcal toxins, and are not to be measured by microscopy.

6. The entire work, though highly interesting, is but a testimony to Doctor Markley's diligence and patience. It has no greater value than to show the futility of studies of the phagocytic

index in so far as they offer us any help in our understanding of a given case of gonorrhea.

Aside from the determination of the presence or absence of the gonococcus the greater value in our studies of these urethral discharges is to be found in their cytological characteristics. While these have no such wide range of diagnostic or prognostic utility as some have tried to give them, they at times do furnish us with some valuable information. The most important points brought out by studies of the cellular elements in urethral discharges can be enumerated about as follows:

1. Though epithelial cells are present in most discharges, the polymorphonuclear leukocyte predominates in gonorrhea.

2. During the florid stage of gonorrhea epithelial cells are few in number, but frequently increase in numbers in the later stages. This increase, however, is commonly determined by the type of treatment used, and is not always a characteristic of the disease per se.

3. The presence of large numbers of epithelial cells during the florid stage of gonorrhea almost invariably means the given urethra is being treated by stronger chemicals than it should be. The occasional exception to this is due to stricture of small caliber.

4. The presence of large numbers of squamous cells in a chronic discharge indicates either much traumatic urethral treatment or a stricture of small caliber. The history and the size of the urinary stream quickly give the answer.

5. The presence of eosinophiles in late gonorrhea is an interesting phenomenon, upon which we have been able to place no significance.

Added knowledge is to be gained by a study of the kinds of bacteria present in the urethral discharge. In gonorrhea between the second and fifth days the gonococcus has the field to itself. After this the other bacteria, particularly staphylococci and diphtheroids, begin to make their appearance. The more numerous

are these secondary invaders, the less numerous are the gonococci. In the presence of urethral stricture or a long prepuce, these secondary bacteria may, and commonly do increase in numbers very rapidly, so that within a few days the gonococci are by far in the minority, while there are hordes of bacteria of many types. So true is this that the presence of a large assortment of bacteria in the subsiding stages of the disease in a patient without a redundant prepuce almost always means that he has a urethral stricture.

Turning to the study of that surprisingly large number of urethral discharges that are not occasioned by gonococcal infection, we find that a number of valuable conclusions can be arrived at by the use of a microscope. Here, too, a predominance of epithelial cells bespeaks either great urethral trauma or stricture, and in both conditions countless bacteria of many types are usually present. Likewise a varied bacterial flora commonly is to be found where the prepuce is redundant.

As the larger number of non-specific urethral discharges are secondary to a non-specific prostatitis, and as staphylococci and diphtheroids predominate in such prostates, so do these bacteria predominate in the larger number of anterior discharges.

An acute discharge, recurring from time to time and showing a varied bacterial flora in the absence of stricture and a redundant prepuce, is generally caused by an irritating vaginal secretion.

An acute discharge, showing practically nothing but polymorphonuclear leukocytes and no bacteria, is almost always due to the chemical irritation of some urethral injections.

Recurrent discharges exhibiting nothing but squamous epithelial cells are caused by the periodic shedding of large numbers of these cells, due to Nature's overproduction of protective cells to combat an almost endless amount of urethral trauma.

XIV. THE CLINICAL COURSE OF GONORRHEA

THERE has always existed much confusion regarding the clinical course of gonorrhea in the male. It has seemed a disease so erratic that there was little apparent similarity between cases. Various near-rules laid down regarding the matter have been made so flexible that they practically ceased to be rules and ceased to be of help. Attempts to group cases according to the virulence of infection and the resistance of the individual have met with indifferent success. A broad study of the question shows that our cases not only can be grouped as to type and expectancy, but that certain rules can be laid down regarding practically all cases of the disease; that the disease really shows a moderately fixed trend in all patients, and that variations therefrom are questions rather of conduct and treatment than of virulence and resistance.

While the degree of inflammatory reaction may differ markedly in different individuals, one has to consider only the peak of these symptoms as belonging to the case in hand. Their general trend can be considered to belong to its particular type of case. In order to study the course of the disease, one must make a very close distinction between what is really due to the disease and what is due to faults in the personal conduct of the patient or to the plan of treatment.

What is termed "lack of resistance" is only occasionally a factor in greatly altering the course of the disease, perhaps not more than once in every 200 cases. Even then it merely serves to prolong the various stages and not otherwise to change the general clinical tendencies. Most individuals are, in a sense, tardy in developing those particular tissue changes that make for cure, but practically all males eventually will develop them. By this is meant that almost every male has it in him to cure his own disease

by his own body processes; that total lack of resistance to gonococcal infection of the male urogenital tract is hardly ever encountered.

There are certain things inherent in the individual that tend to govern the speed of the disease extension, which are not necessarily dependent upon the virulence of the infecting bacteria. Some of these are due to his own histological pecularities, as was pointed out in our consideration of cellular susceptibility. Some are anatomical in the sense that they act through interference with free drainage of the purulent products. Besides these there are those individuals, notably blonds, who under the best of circumstances at times have prolonged attacks of gonorrhea in which complications are frequent. This latter group, however, merely belongs among those who have longer stages, but follow much the same trend as others.

The most constant characteristic of untraumatized gonorrhea is its definite trend toward latency. Having once started upon this trend it is extremely rare for it to change for the worse except as the result of some easily avoidable influence. If a patient with anterior urethritis begins steadily and markedly to improve, he will continue to do so unless subjected to some one of the many types of what we have called "trauma" in its broadest sense. The same can be said of a patient whose anteroposterior symptoms are subsiding. Unless interfered with, the body's curative processes are increasingly progressive. They are, however, so delicately balanced that they can be checked or entirely obliterated by seemingly slight influences.

Aside from the appearance of discharge at the meatus, and the patient's subjective symptoms, the voided urine gives us our best opportunity for following the course of a given infection. So sensitive is the urethral mucous membrane to gonococcal infections that its purulent responses occasion an easily readable picture up to the period of complete latency. In our interpretations we always

must remember that a perfectly clear urine may be voided for weeks and the disease still be present. It is the habit of the gonococcus to colonize in poorly draining structures and such colonization may not, and often does not give any evidence whatever in the voided urine that it exists. With, then, the reservation that the urinary picture often clears long before the patient is cured, we are safe to base an opinion of the progress of the case upon the two-glass test of the urine.

In an endeavor to establish some standards whereby to judge the therapeutic results in some experimental work upon gonorrhea, the writer started to chart graphically the urine trends of a number of dispensary patients whose sole treatment had been oral medication. As this was done on many old histories, it brought out a number of interesting and important points about the course of the disease. It, likewise, proved to be a means of judging quickly just how each individual case was progressing, and of keeping check on the patient's conduct as well as on the effects of the treatment used.

To avoid error and favor uniformity in one's interpretations of the two-glass test, it is highly important that certain simple precautions should be observed. It not infrequently happens that so little urine is voided into the first glass that it does not cleanse the pus-filled anterior urethra, so that sufficient pus remains to cast a definite suspicion on the second glass of urine. Again, many patients with a redundant prepuce have the habit of holding the preputial meatus during the act of urination so that the preputial sac is ballooned with urine and any retained pus is washed into both glasses. It, therefore, is well to instruct the patient to retain his urine for an hour or two prior to his visit, and to pass at least two ounces into the first glass. Prior to voiding a redundant prepuce should be retracted.

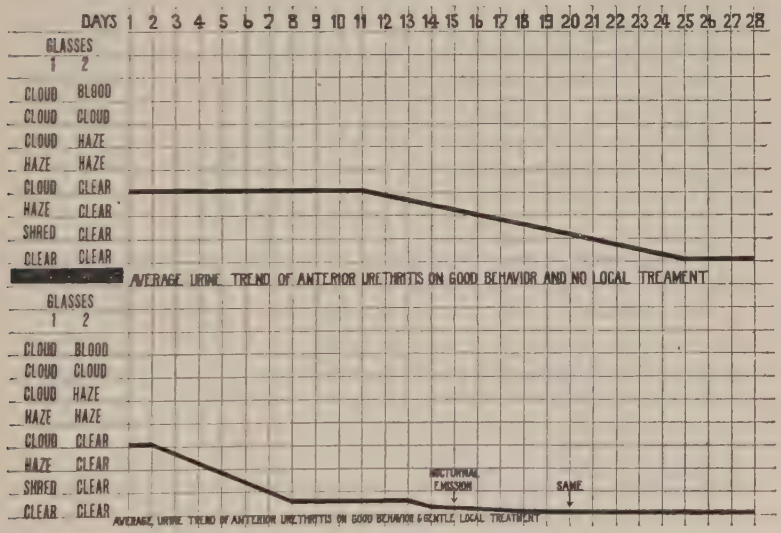
To secure a sufficiently wide range in charting, a rubber stamp has been made showing eight different urinary pictures.

Glasses 1	2
Cloud	and Blood
Cloud	and Cloud
Cloud	and Haze
Haze	and Haze
Cloud	and Clear
Haze	and Clear
Shred	and Clear
Clear	and Clear

This is stamped on paper having a $\frac{1}{4}$-inch quadrille ruling. The spaces between the perpendicular lines each represent one day, so that it is only necessary to place a dot upon the perpendicular line at its intersection with the appropriate horizontal line to make the daily record. The recording of these urinary pictures in this way adds a simplicity equal to that of our present methods of recording temperatures, and gives one an instantaneous grasp of the course of the disease in the given case.

The accompanying charts serve to bring out very clearly the value of graphic charting, and really teach us a great deal about

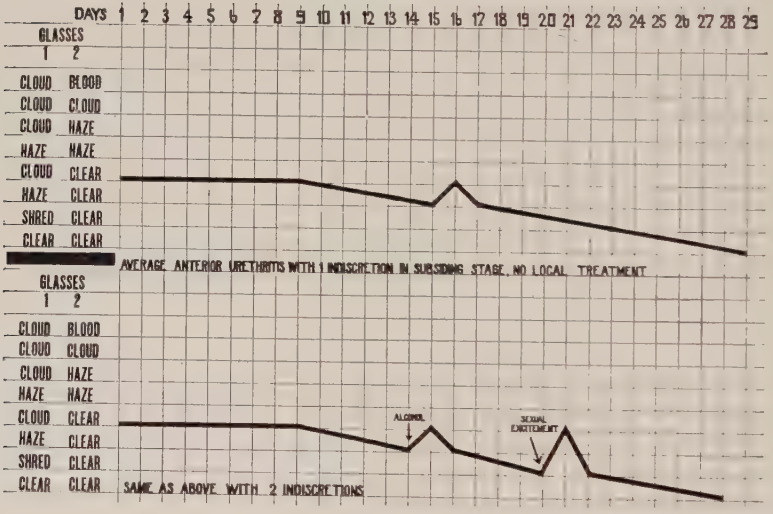
CHART I


DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28
GLASSES 1 2
CLOUD BLOOD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
AVERAGE URINE TREND OF ANTERIOR URETHRITIS ON GOOD BEHAVIOR AND NO LOCAL TREAMENT
GLASSES 1 2
CLOUD BLOOD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
NOCTURNAL EMISSION
SAME
AVERAGE URINE TREND OF ANTERIOR URETHRITIS ON GOOD BEHAVIOR & GENTLE LOCAL TREATMENT

the course of the disease. In the first case on Chart I we see the average urine trend of anterior urethritis, uninfluenced by local

treatment but greatly favored by exemplary behavior and good curative processes on the part of the patient. Such cases are far too rare, for it is our experience that they represent less than 5 per cent. of those patients who receive no local treatment, no matter how good the conduct may be. In the second case of Chart I we see the effect of gentle local treatment instituted very early in the disease. Instead of the long "peak" there is a gradual improvement from the second day of treatment. The urine has

CHART II

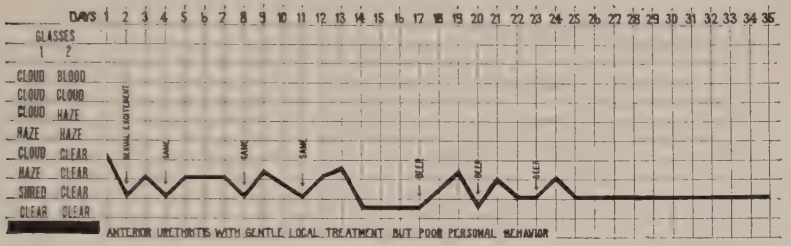


rather quickly cleared, nor have two nocturnal emissions made any change in it. There is an even greater contrast that does not appear in the chart. If the treatment is sufficiently gentle and started within the first four days, better than 80 per cent. of the cases will show a urine trend almost if not quite as good as this one.

Chart II shows the occurrence of toxin responses following untoward events. Occurring in the subsiding stages of the disease they have made only transient changes in the urinary picture. While it is common to see such influences act as the determining factors in further extension of the disease to the posterior urethra,

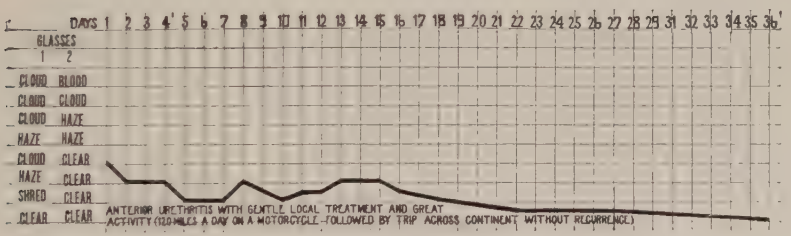
they more frequently occasion changes such as are shown here unless repeated a number of times. This only can be said of those taking place after the urinary picture has shown definite clearing, for when the first glass of urine is cloudy such indiscretions almost always are followed by acute involvement of the posterior urethra, if not more.

CHART III



Upon very rare occasions patients will be encountered who show such a marked resistance to infection of the posterior urethra that, though they indulge in frequent indiscretions, their disease remains in the anterior urethra alone. Such will be seen on Chart III. Though experiencing repeated insults even as late as the twenty-third day, there was no evidence of posterior urethritis.

CHART IV

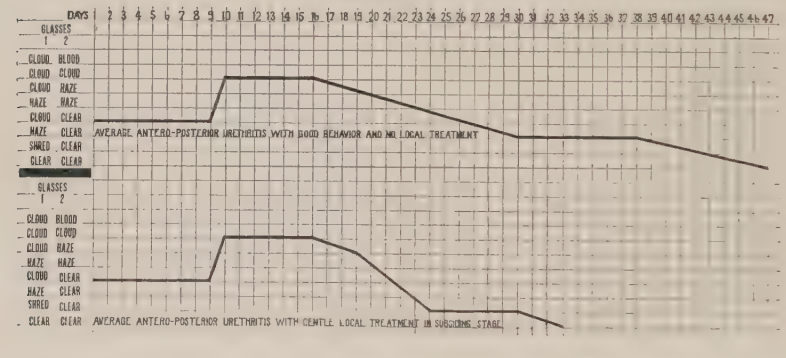

DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36
GLASSES
1 2
CLOUD BLOOD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
ANTERIOR URETHRITIS WITH GENTLE LOCAL TREATMENT AND GREAT ACTIVITY (120 MILES A DAY ON A MOTORCYCLE) FOLLOWED BY TRIP ACROSS CONTINENT WITHOUT RECURRENCE)

Each caused its transient clouding of the urinary picture, and the result of the entire number was to produce that extremely rare condition of chronic anterior gonorrhea.

Chart IV illustrates how little great activity influences most cases of gonorrhea. Much experience with graphic charting in

gonorrhea has brought out the fact that the activity to which the individual has been accustomed generally has little or no effect upon the course of his disease. There are, of course, exceptions to this rule, and, strangely enough, most of these exceptions occur in blonds. At best they do not represent 3 per cent. of all cases. Such an observation came as a distinct surprise to the writer after the years spent in trying to curtail the physical activities of those afflicted with gonorrhea. As a result of these usually needless prohibitions, not a few college students treated by him have been compelled to return to college because they had insufficient counts in "Physical Exercise" for the issuing

CHART V


DAYS
GLASSES
AVERAGE ANTERO-POSTERIOR URETHRITIS WITH GOOD BEHAVIOR AND NO LOCAL TREATMENT
AVERAGE ANTERO-POSTERIOR URETHRITIS WITH GENTLE LOCAL TREATMENT IN SUBSIDING STAGE

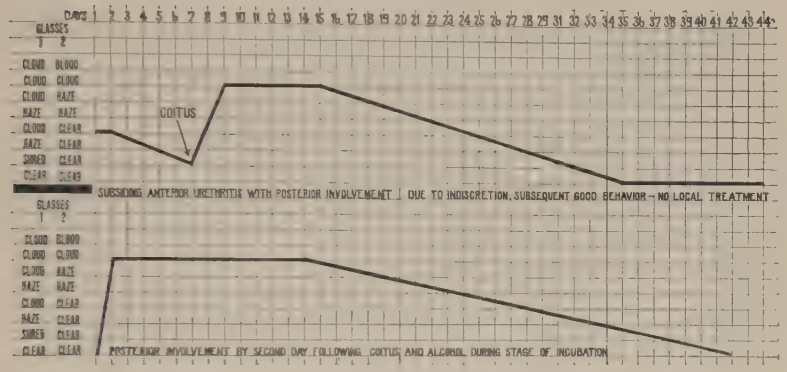
of diplomas. During the last few years he has made no such restrictions and has had no cause to feel that any of them were harmed thereby. By careful observation of the urine trends those patients who will be harmed by great activity can be discovered readily.

Chart V depicts the usual urine trend of anteroposterior gonorrhea in the absence of local treatment, but with good behavior. In the second case gentle anteroposterior irrigations were started on the nineteenth day and, as will be seen, they markedly shortened the subsequent course of the disease.

In Chart VI we see two very interesting disease manifestations. The first case indulged in coitus upon the seventh day, when he

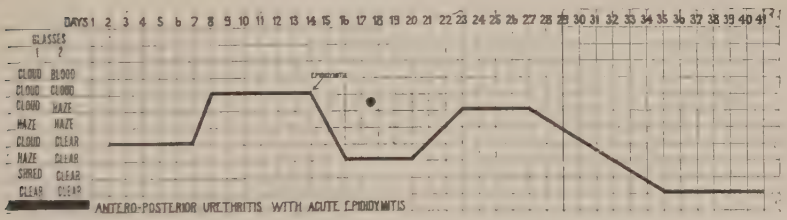
was showing very good immunity response. Not only did this occasion an almost immediate extension to the posterior urethra, but it seemingly so obtunded his immunity efforts as to make a very long line of decline in his second subsiding stage.

CHART VI


DAYS
GLASSES
COITUS
SUBSIDING ANTERIOR URETHRITIS WITH POSTERIOR INVOLVEMENT | DUE TO INDISCRETION, SUBSEQUENT GOOD BEHAVIOR – NO LOCAL TREATMENT
POSTERIOR INVOLVEMENT BY SECOND DAY FOLLOWING COITUS AND ALCOHOL DURING STAGE OF INCUBATION

The second case on this chart shows almost immediate infection of the posterior urethra as the result of alcohol and coitus during the stage of incubation. Such an occurrence is difficult to understand, and makes one feel that there must have been a latent anterior urethritis antedating the supposed time of infection. One,

CHART VII



however, occasionally observes such a disease vagary in an individual who has had only an isolated sexual exposure, and in whom such an explanation would not hold.

The case in Chart VII shows the usual influence of acute epididymitis upon the urine trend. The reduction of purulent dis-

charge during the first few days of the complication occasions a temporary clearing of the urinary picture, with its subsequent clouding as the acute inflammation in the epididymis subsides. It is usual in such cases to note a rather sharp line of decline once the second recrudescence of discharge has started to subside.

As one studies these charts, together with those in the later chapters, it becomes apparent that the first indication we have that Nature really and successfully is marshalling her protective forces rests in a clearing of the urinary picture. In other words, there is less pus, and through all of these years we have been inclined to view gonorrheal discharge as the grand effort to eradicate infection by carrying out the gonococci. We have even said that the patient with the profuse discharge recovered more quickly, whereas the reverse is unquestionably the case. The patient with the profuse discharge more commonly develops posterior urethritis, and is more prone to have complications not generally seen in others with a scanty discharge. So true is this that the mark of a good treatment is, except with astringents, the speed with which it clears the urinary picture.

Perhaps the most characteristic thing in the course of gonorrhea is the definite trend toward latency that is shown by the ever-present line of decline, the length of which varies with the treatment and the type of case. Little observation is required to demonstrate the fact, that from the onset of this line of decline there is a progressive and continuous improvement in the disease which, uninterrupted by avoidable influences, leads on to cure. So true is this, that from the moment the urinary picture begins to clear we can with safety attribute any sudden change in it for the worse to the treatment or the patient's conduct. Such being the case, it will be seen that during this period at least we find in this method of charting the urine trends a ready and reliable way to judge of the efficacy of our therapeutic efforts, as well as the influences of activity and of diet. As all of these matters are fully

considered under their appropriate headings it is needless to enlarge upon them at this juncture.

Viewing the question in its entirety the course of gonorrheal urethritis is far from the complicated thing we have always deemed it. It is susceptible to division into two great types, anterior and anteroposterior. Each variety can differ in severity and each, uninterfered with, will occasion a characteristic urinary picture up to the stage of complete latency. Each picture can be changed for the worse by an assortment of ill-advised and unfortunate events, and most can be markedly improved by gentle local treatments. Each, with or without treatments, eventually will reach a stage of latency wherein there are no subjective or objective signs of the disease, and during this stage the symptoms of the disease generally can be made to reappear with the greatest ease.

So greatly does charting of the urine trends during the course of gonorrhea narrow the field, and so closely do these trends follow more or less fixed lines, that it is possible to base upon them a number of rules that greatly aid us in our understanding of the subject. The more fixed and striking of these rules can be enumerated as follows:

1. When charted, the urine trends, in the absence of trauma in its broader sense, show, except at the onset of acute posterior urethritis and epididymitis, practically horizontal lines or gradual declines.

2. Once the line definitely declines toward the base line, it will continue to do so with but slight oscillation unless influenced by some preventable occurrence having a deleterious effect on the disease.

3. Except in the two conditions named in Number 1, sharp rises or depressions of the charted line are not due to the disease per se.

4. Any sharp rise in the declining stage is an evidence of misconduct on the part of the patient or over-strenuous treatment.

5. The rise due to a single, mild untoward event, is usually of not more than three days' duration. Great trauma, or repetitions of it, may cause a continued higher level of the charted line.

6. A higher level occurring shortly after the institution of another type of treatment, and continuing so, is evidence that the treatment is being roughly carried out, or the substance used is too strong for the given case.

7. A sharp decline toward the base line, except at the onset of acute epididymitis, is to be attributed solely to the treatment used.

8. A sharp rise, following a long period on the base line or just above it, that is not due to treatment, is due to a toxin response and is evidence that the gonococcus is still present.

9. A persistently high line in an untraumatized case is evidence of tardy development of resistance.

10. An erratic line in the absence of over-strenuous treatment denotes bad conduct upon the patient's part.

11. A persisting high line without decline in a patient seen late in the disease, generally means that his first doctor gave him a number of large injections of gonococcal vaccine.

12. In the absence of astringent injections, which render all urine studies useless, a short horizontal line, with a sharp line of decline toward the base line, shows good treatment gently used, and good conduct upon the part of the patient.

13. If the first glass of urine stays definitely cloudy for thirteen days or longer, the posterior urethra practically always becomes infected.

CHART VIII

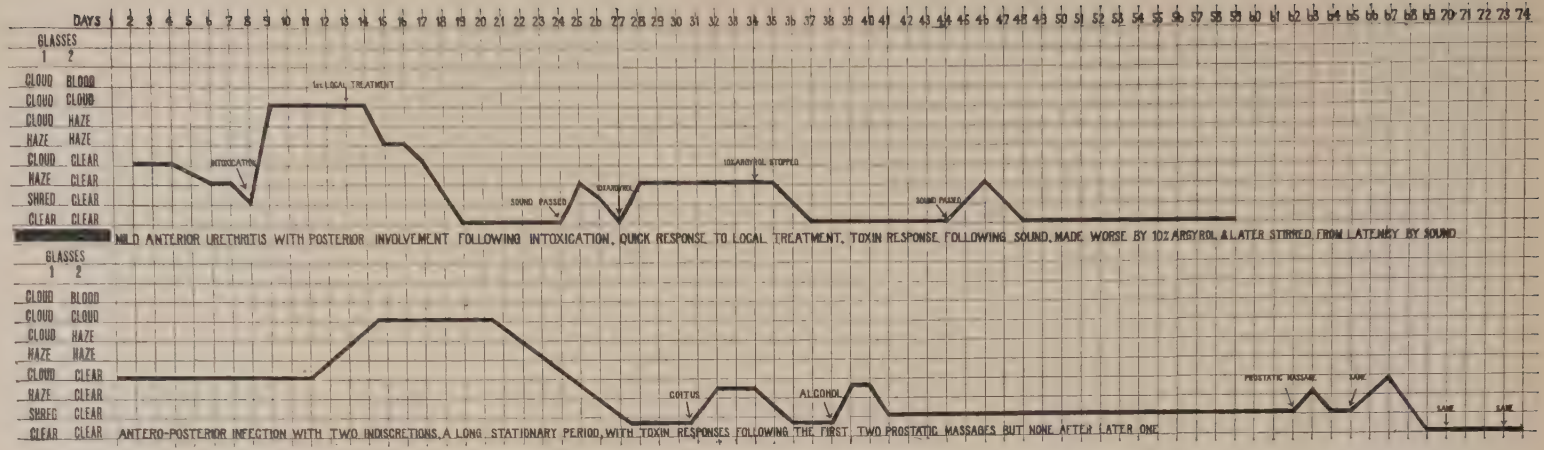


Chart VIII: In the first case we see an individual with good resistive powers becoming intoxicated in the subsiding stage of an anterior infection and immediately developing posterior involvement. On the thirteenth day of his disease he received an intravesical irrigation of potassium permanganate. The response to this treatment was so prompt as almost to prove that his misconduct occasioned his posterior extension. On the twenty-fourth day of the disease his physician unwisely passed a urethral sound and occasioned a marked toxin response. When this subsided the patient was given 10 per cent. argyrol injections. The change in the urine trend gives ample evidence that this solution was too strong, for discontinuing it caused a prompt clearing of the urine. On the forty-fourth day the physician again tried a sound, and caused a recrudescence of discharge. After this both the patient and the physician behaved, and the former had a chance to get well.

In the second case we see an average anteroposterior curve with two later toxin responses from misconduct, and two much later ones from the first two prostatic strokings, but none after the subsequent ones.

XV. THE CAUSES OF COMPLICATIONS

Regarding the causes of the various complications of gonorrhea, it has been the custom to accept many of these unfortunate occurrences as unavoidable features of the disease itself, as the patient's misfortune and no one's fault, whereas, in reality, a little closer study would have shown that most of them could be prevented by the exercise of a little care on the part of both physician and patient. So disastrous and far-reaching are some of these complications, that their prevention is unquestionably one of the most important phases of the entire subject and well worthy of the closest scrutiny.

It is well within the realms of safety to venture the statement that the composite picture of gonorrhea in the male, as we see it clinically in our country today, is made up of about 30 per cent. disease and 70 per cent. avoidable conditions. Such a statement is hardly conducive to pride in the efficiency of medical practice, but, unfortunately, the profession must shoulder much of the responsibility for this disappointing state of affairs. Let us not, however, think too much of the past, except in so far as it may serve as a background of experience for the doing of better work and the elimination of those factors that have been instrumental in making the dark shadows in the composite picture of current practice.

Gonorrhea is the most poorly treated of diseases. This is so, largely because too much has been taken "on faith," and too little time has been spent in worthwhile analysis. To ask "why?" has been too often omitted; well-blazed trails commonly based upon faulty conceptions have been too generally blindly followed. In this way there have been developed and used means of treatment that are inappropriate to gonorrhea, or are inappropriate at the

times they commonly are used. In a smaller measure has been lost sight of the patient's immense part in the production of complications, and, therefore, there has been failure to make sufficient effort to gain his enthusiastic co-operation. Applying to an analysis of these complications, our clinical knowledge of them, and of the more common occurrences preceding their onset, we shall see that the majority of them are to be found in certain groups of patients. In fact, if we divide our patients into three great groups and consider the complications found among them, we can, by a process of elimination, greatly narrow our field. A further study of the complications themselves not only limits the field further, but likewise accentuates many of the etiological factors, and shows how easily avoidable most of them are.

Group 1. Those patients whose conduct is above reproach throughout the attack and who receive only oral treatment.

Group 2. Patients upon extremely mild and gentle local treatment, absolutely free from trauma and of exemplary conduct.

Group 3. Patients receiving strenuous treatment such as the passage of catheters or sounds, high-pressure irrigations or injections, too-strong solutions, large doses of gonococcic vaccines, and what not, and whose conduct is generally bad.

In Group 1 we may see balanoposthitis if the prepuce is redundant, but we seldom see phlebitis, lymphangitis, phimosis, or paraphimosis unless the patient has had coitus or masturbated just prior to the appearance of his urethral discharge. Arthritis is not common, posterior urethral involvement is almost 100 per cent., as is the concomitant prostatitis, and epididymitis is extremely rare. If there is not an urethral stricture or pin-point external urinary meatus, cowperitis and follicular abscesses do not occur. Despite this the disease usually is of long duration.

Group 2 shows all of the good points of Group 1, and a far smaller number of posterior urethral extensions of infection. Under such conditions the disease is cured more quickly.

Group 3 is the worst of all, and contains such an enormous percentage of complications of gravity other than posterior urethritis that it hardly seems possible that it is the same disease. Phimosis,

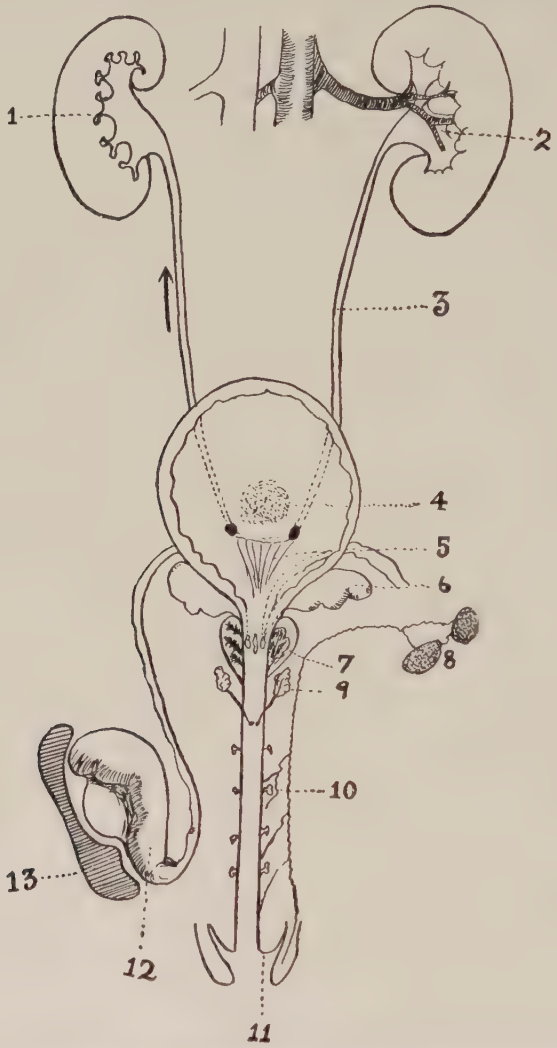


Fig. 32.—Urogenital sites of extension of urethral infection by the gonococcus (diagrammatic, after Legueu and Papin): 1, Nephritis; 2, pyelitis; 3, ureteritis; 4, cystitis; 5, trigonitis; 6, seminal vesiculitis; 7, prostatitis; 8, inguinal adenitis (bubo); 9, cowperitis; 10, folliculitis; 11, balanoposthitis; 12, epididymitis; 13, inflammatory hydrocele.

paraphimosis, lymphangitis, lymphadenitis, follicular abscess, cowperitis, posterior urethritis, prostatitis, prostatic abscess, seminal vesiculitis, epididymitis, and gonorrheal rheumatism are so common that they probably comprise at least 90 per cent. of all such complications observed.

From such an analysis it is seen that some of the complications of the disease are due to infection by continuity of surface, and belong to the disease per se, but that by far the larger number are the direct result of what the patient or his physician does and, as such, are usually preventable.

It would not be amiss to pursue our consideration of these complications separately to accentuate their usual determining factors. The writer has given very close attention to this phase of the disease over a number of years, and feels that he has obtained ample basis for the opinions given.

Phimosis and paraphimosis: These conditions are rarely met with in private practice, and when they are it is generally possible to elicit a history of direct injury to the parts, such as coitus or masturbation, between the acquisition of the infection and the appearance of the symptoms. They generally are found in the less restrained type of individuals who frequent dispensaries. Phimosis is occasionally seen as the result of balanoposthitis.

Dorsal phlebitis, lymphangitis and lymphadenitis: The latter, in a mild form, is sometimes seen in a well-conducted office practice. In its most marked states it is associated with the first and second, and belongs to those patients who subject themselves, or are subjected, to trauma during the acute stages of the disease.

Follicular abscesses and cowperitis practically never are seen where the urethral caliber is normal, and the canal has not been subjected to high-pressure injections or the early resort to instruments.

Posterior urethritis and its concomitant prostatitis are due to

extension by continuity of surface, or by forcing infection back by injudicious treatment. Careful, gentle anterior urethral treatment and good conduct on the part of the patient will reduce their incidence to less than 15 per cent. of those seen early in the disease.

Seminal vesiculitis and epididymitis are generally confined to dispensary patients, or those office patients who are given intravesical irrigations at high pressure. They are both easily preventable, and will be considered further in their appropriate places.

Gonorrheal arthritis occurs at times in the most ideally treated patients. Its occurrence directly after the passage of instruments,

Fig. 33.—Location of abscess of Tyson's gland. These are generally considered to be follicular abscesses. They have no connection with the urethra, but are infected from the preputial sac.

a meatotomy or the opening of a juxta-urethral sinus, and the fact that at least 75 per cent. of the cases belong in Group 3 gives ample evidence that direct trauma to the urethra is one of the commonest determining factors. It is, therefore, a largely preventable complication. The same can be said of gonococcal septicemia.

It is safe to say that that far too common sequel of gonorrhea, urethral stricture, is almost always the result of deep and marked inflammatory infiltrations that are caused by urethral trauma during the acute or subsiding stages of the disease. Strictures rarely, if ever, follow gently treated gonorrhea. This is practically

proved by the fact that in China urethral treatments are not used in gonorrhea, and stricture of the urethra as a result of gonorrhea is not seen.*

Taken in their entirety nothing could offer a stronger argument for the great need of the utmost gentleness in the treatment of gonorrhea than do these 70 per cent. avoidable misfortunes.

* Verbal communication by Dr. Charles H. Frazier.

XVI. PROPHYLAXIS

It would seem that the only really sure prophylaxis against venereal diseases is continence. Under present social conditions this seems to hold fewer devotees each year. It lacks in the attractive binding power necessary to overcome the urge in the other direction. The gradual emancipation of youth has brought about a very intimate commingling of the sexes; and with the laxity of customs and the scanty attire of the modern woman the lure grows stronger and stronger as our so-called civilization advances and the inhibitions dwindle.

Next to continence, the use of the condom is probably the safest prophylactic measure, but this, carelessly used, is far from absolute. Soap and water, promptly and thoroughly used, are also most valuable measures. The gonococcus is very quickly killed by soap solutions, and their detergent power is of great value in removing bacteria. Those that have gained entrance to the urethra obviously are not killed by these external ablutions.

Chemical means of prevention, such as the injection of substances into the urethra, are of great value if used immediately after sexual contact. Their value is greatest in the first two hours and decreases rapidly as time intervenes. In some cases they seem to exert an influence as late as twenty-four hours and should be tried even that long after exposure. The increasing number of attacks of gonorrhea appearing in those who have carried out the injection of so-called prophylactic substances immediately after sexual exposure is to be attributed almost entirely to the fact that many of the commercially exploited prophylactics are decidedly inefficient. The writer has treated a number of cases of gonorrhea occurring after the apparently proper use of two of them that have gained much reputation among the initiated.

In using prophylactic injections the patient should pass his urine and gently fill the urethra with the germicide. Silver nucleinate, or argyrol, 10 per cent., protargol, 2 per cent., mercurochrome 220, 2 per cent., or potassium permanganate, 1 : 3000, are most commonly used, and should be retained for at least five minutes. In some individuals these substances, in the strengths given, are prone to produce a mild chemical discharge for some hours after use. It is well to warn the patient of such a possibility to avoid undue alarm upon his part if this occurs.

The external genitalia should be thoroughly anointed with a 30 per cent. calomel ointment as a prophylaxis against syphilis. This should be allowed to remain for some hours.

XVII. OUR UNCHANGING THERAPEUTIC POSITION

About forty years ago that great student of gonorrhea, Ernest Finger, said, "We venture to assert boldly that there is no department of general medicine in which such unscientific and routine treatment is adopted as in the case of blenorrhea. A clap syringe of tin, hard rubber, or glass, a collection of thirty to forty recipes for injections are the entire armament of the large majority of physicians. No wonder then that this so frequent disease is a true *crux medicorum*, and forms the '*partie honteuse*' of general medicine." After the lapse of almost a half century one who honestly views things in the light of present conditions finds it difficult to say that the picture has been very greatly improved.

As physicians it is probable that we seldom realize how much our therapeutic efforts commonly do toward prolonging instead of shortening this battle. Many of our forms of treatment are definitely devitalizing to an urethral mucosa that is crying for real help, and instead of helping we often hinder.

At least 95 per cent. of male gonorrheics in this country are being treated by the general practitioner. The vast majority of physicians will admit frankly that they really know little about the disease. This need not hurt their feelings very much because so many of the urologists are interested in surgery, and are not thinking gonorrhea, and do almost as many foolish things and call them "treatment." Our text-books contradict themselves and one another, and in doing so they spread confusion. If our recognized sources of information spread confusion we cannot be greatly condemned if we do the foolish things they often tell us to do; and, if we do these things earnestly and conscientiously and the patient does not improve as he should, it is his misfortune because he contracted the disease before the world knew how to treat it properly.

If we love humanity, this places upon us as humanity's physicians the necessity of getting very busy and finding out how to treat gonorrhea before the world crumbles from advanced age.

To do this we must entirely alter present conditions by finding out just what are the processes leading to cure, and just what forms of treatment help or hinder these processes. To the completion of this is evidently a long, long journey, and humanity cannot sit by the roadside until we reach its termination. Therefore, while some of us make the journey, let the rest of us make the best uses of the things we have today, and avoid the doing of foolish things.

Certainly we have advanced far enough to discontinue many of the most unscientific and hurtful forms of treatment, for there are many that have little to recommend them. We should be in a position to see how hopelessly ridiculous are the claims of the manufacturers of gonococcicides, based upon their action in the laboratory where conditions in no way resemble those in the urethral mucosa. We should have too good judgment to reaccept the ideas that our forefathers tried and discarded, as they did astringents, the use of which conflicts with every one of Nature's means of cure, except possibly bacteriostasis, and even in that does poorly.

An analysis of the ideas underlying the plans of treatment of gonorrhea in the male in vogue at the present time and, in fact, for many years, shows them to consist largely of two extremes of thought. The first, the so-called oral plan of treatment, throws upon the patient and his reactive processes the entire task of curing the disease. It is not really believed by those who follow it that medicines by mouth do much more than render the urine bland and non-irritating. Consequently, belief in the efficiency of oral treatment must be based upon the view that gonorrhea is a self-limited disease that needs but to be let alone. Such, indeed, was one of the views taken by John Hunter.

The second plan of treatment is unquestionably based upon the idea of slaying bacteria through direct local attack by some germicidal substance. It does not take into account any reactive powers the patient may be able to marshall, but winnows the chemical products of the world in the more or less vain hope of finding an ideal germicide.

There is more evidence to suggest that both are wrong than that either is wholly right. If one could call either basic idea better than the other, the favor would fall in the direction of the former or oral plan. For it is much in evidence, that under ideal circumstances gonorrhea in the male is a self-limited disease. However, under the conditions of modern life it is obvious that these so-called "ideal circumstances" seldom can be obtained. Lacking, then, the one essential requirement, little can be accomplished by dependence upon the thought that the patient will recover if let alone.

Rendering the urine "bland and unirritating," in so far as final recovery is concerned, probably is of such small value that it, too, might be omitted. There is more reason to think that a slightly irritating urine would give more local stimulation than the reverse. There is equal reason to believe that the secretions of the urethra within five minutes over-correct any influence, occasioned therein by the passage of any type of urine. Dr. S. Gonzales and the writer have shown that the passage of either an acid or alkaline urine through the urethra causes an almost immediate increase in urethral alkalinity. So rapid is this increase in hydroxyl ions in the urethral secretions, and so independent is it of the degree of acidity or alkalinity of the voided urine, that we probably can dismiss any thought that medication has value due to a power to influence gonorrhea through any change it may cause in the character of the urine.

Oral medication as a means of curing urethral gonorrhea undoubtedly takes the position usually accorded a placebo. As such

it derives its real value from the efforts made in controlling the patient's conduct and eliminating those things known to have a deleterious action upon the disease. From this standpoint it has much in its favor; and carefully and persistently followed, it would at least bring about but few of those severe complications that make for chronicity. At the same time one who relied only upon oral treatment would find the disease rather longer lived than would be attractive either to himself or to his patient. Further, the prolonged periods of latency experienced by patients so treated would transport many of them into the "fools paradise" of fancied cure while, in reality, they were still infected and still capable of infecting others. Indeed, this oral or expectant plan of treatment of an essentially local disease, presents a decided social hazard. It requires the closest restraint of the patient for great periods. And it usually means prolonged intervals during which physician and patient do not meet. This in itself engenders an indifference out of all proportion to the seriousness of the infection; and, unfortunately, but few patients deport themselves in such a manner that they go on to cure without avoidable mishap.

Passing to the other extreme of the basic ideas of treatment, the direct slaying of gonococci, one finds even more to criticise. In the face of countless things to prove it in error it has held the forefront of therapeutic endeavor for years out of mind. It has filled the coffers of the manufacturing chemists, and refused to let the pendulum of thought find any point between the two extremes. It has steadily refused to admit the validity of the arguments against it, and has blundered blindly along in the hope that some day it would do the impossible. In it the minuter pathology of the disease has held no place, nor have the known limitations revealed its futility. On the contrary, the bactericidal idea has become a fetish to the point of bigotry, and has so narrowed the field of thought on gonorrhea that it will take ten years of missionary work

to convert all of those who cling to a belief that is based upon false premises that make for it the most insecure foundation of all measures for the cure of human disease. No line of thought has done more to retard progress.

In a search for the real truth regarding the best methods of treatment of gonorrhea, one must not follow blindly these extremes of thought, for in that broad expanse between them rests his safer ground. There can be no doubt regarding the ability of the urogenital mucous membranes eventually to rid themselves of the gonococcus. The doubt is as to their ability to do so as quickly and surely without some form of local treatment. The fact that certain forms of local aid do assist and hasten the process has led to that wide-spread conviction that our only aim should be to kill the gonococcus.

That we cannot expect to control the disease through the use of direct bactericidal chemicals is so strongly evidenced by the entire pathological and clinical picture that one wonders how we have succeeded so well as we have. Most of our success is to be ascribed to that highly fortunate coincidence that some of the things we have used have had the power to stimulate certain tissue processes, as well as to kill bacteria. One merely has to view the broad field of therapeutic experiences to bring this out in high relief. It has been our experience that, though we have been lured away countless times by substances exhibiting enormous bactericidal powers, we have each time returned to those far less potent in this particular. Not only have we returned to them, but it is the rather general concensus of opinion that they have given us our best results. This they could not have done through their direct power of killing the gonococcus, for in this regard they are only from one-fortieth to one-sixth as potent as the more powerful ones that have given us such uniformly poor results. Beyond this, year after year, as we have returned to them, we have used them in far weaker concentrations, an added argu-

ment against the theory of their admitted values being dependent upon their germicidal powers.

In order to see if bactericidal value was the sole need for cure the writer, with the help of Dr. Sergio Gonzales, treated a series of dispensary cases by the retention of a 1 : 800 solution of tincture of capsicum in the urethra for five minutes. This strength of solution was used because it was previously determined by Dr. Frederick S. Schofield that it gave an urethral discomfort and purulent response about equal to that occasioned by 5 per cent. silver nucleinate. The results were equally as good in this group of patients as were those obtainable in a like class of patients by the use of any of the germicides. On the whole, this did much to convince us that the paramount need for cure was mild mucosal stimulation and not the direct killing of gonococci.

Were the direct slaughter of superficially placed gonococci the sole consideration, such substances as mercurochrome-220 and acriflavine should have solved the question of cure, a thing they most signally have not done.

Indelibly written in the pathological histology of the disease is the evidence that there is little likelihood of our finding a chemical germicide that in sufficient strength will pass down into the depths of the mucous membrane as far as does the gonococcus. Placed securely beyond the reach of these germ killers, the feeding foci of gonococci live on. True, the same cannot be said of those bacteria that are within the sphere of action of the bactericide used, but there then arises another question regarding the need for killing these gonococci. It will be recalled that the superficially placed gonococci, and those in the urethral lumen, practically all are taken up by the polymorphonuclear leukocytes. It was also pointed out that such phagocytosis harmed neither the leukocyte nor the gonococcus, but that, thus enveloped, the bacteria were preserved for far longer periods than were required for their removal from the urethra in the presence of even fairly good

drainage. All of which would raise a great question regarding the value of even trying to kill such gonococci, unless one feared that they might otherwise be transferred to the conjunctiva or to some other individual, or that, by killing them, further surface extension might be prevented.

Aside from all of our years of experience in this disease, it is becoming increasingly evident in many other fields that many of the ideas that have been cherished over-long regarding the general question of the action of chemical germicides, might profitably be abandoned in so far as human infection is concerned. We have grown to see but a very narrow portion of the entire picture. Our field of vision has encompassed only hordes of pathogenic bacteria, to which we must feed something that will quickly and directly cause their demise. And when we have failed, as we commonly have, rather than suspect that our basic idea might contain some flaws, we have suspected only the method of use or the substance used, and have tried to invent a new method or have tried a new substance. We should have traveled further in the direction of truth if we had not clung too tenaciously to our "basic idea." The processes of recovery from bacterial diseases are seldom so simple, and generally involve more than our bacteriologically murderous onslaughts can accomplish.

XVIII. GOOD TREATMENT

It is probable that nothing would do more toward the ultimate solution of the treatment of gonorrhea than for us universally to realize that our antiseptics and bactericides do good only in so far as they are able to encourage tissue reaction, and that any direct bactericidal action they may have is incidental and of secondary importance. The result of this attitude would be to stimulate investigation in other directions that offer more chance of real success, and to stop the wild scramble for the ideal chemical germicide that probably is not to be.

If we are to profit by our clinical experiences, we must keep their successes and failures before us and not plod blindly along regardless of them. Until science provides a specific that will quickly and surely cure gonorrhea, it is best to be frank as to the very obvious limitations of treatment and not to grasp at each little straw that floats by. Due to the empyrical basis of all plans of treatment, there has been a tendency to try one and then another with too little thought, inasmuch as none of them have rested on a foundation more secure than a knowledge that they did good, but we did not really know how or why. The diseases of which this may be said grow fewer year after year, and if the present lethargy regarding gonorrhea can be overcome there is little reason to feel that it long must remain among them.

Although one may question the scientific aspects of the foundation whereon we have based many of our plans of treatment, there can arise no doubt regarding the efficacy of many of the things we do toward promoting the cure of gonorrhea in the male. We should, however, give much more thought than we have to obtaining from them the best they can give. To this end we must

have a better understanding of how the disease really is cured, and just what clinical responses should be expected from our therapeutic efforts. These latter, as we have seen in our studies of the graphic charting of the urine trends of gonorrhea, have no variations so wide that they cannot be understood with comparative ease. With but little effort it is a simple matter to determine what is or is not good treatment for the case in hand. It is unnecessary to remain in ignorance of the progress of the disease and fall back upon the timeworn excuses for failure to cure it. A little more gentleness, a milder solution, or a bit more attention to the patient's acts generally will change things for the better.

We have seen that up to the stage of decline each case is, in a sense, a rule to itself. Not that each case must, in spite of treatment, follow its own definite trend, for it will be pointed out later that comparatively few need follow what we have grown to consider the average course and duration. It is apparent that there are certain things inherent in the patient himself that act to a variable degree as determining factors in the earlier stages of the disease. When the stage of decline, whether it be early or late, has been established, it becomes an increasingly simple matter to judge of the results of our efforts.

During the stage of greater activity it is our hope in applying treatment that we may start this stage of decline. Should we fail in this effort we should not off-hand blame the patient's special tendencies, but first should analyze our treatment and the degree of immediate response it is occasioning. Not infrequently the failure to bring about an early stage of decline is due to the concentration of the solutions we use. Solutions of the proper strength are those that cause but slight local discomfort, and only a slight chemical response in the urethral mucosa. This response is characterized by a purulent discharge shortly after the treatment. If the substance used is too strong, this discharge is profuse and continues for some hours. When the strength solution is ideal

the discharge is slight and of short duration. Except as regards the patient's conduct, there is no phase of the subject that equals in importance the determination of the proper strength of solutions used locally. Unquestionably, the good obtained from them is due to their ability to stimulate the urethral mucosa to combat the infection. For this reason their strength should be such as not to overstimulate, for overstimulation has almost the opposite effect from that desired. By the use of too strong solutions in the urethra the process of cure can be held in abeyance indefinitely.

From the writer's experience with the use of hypertonic solutions in the urethra, he suspects strongly that some of the poor results from local treatment are due to the fact that some of the substances used are hypertonic. The use of such substances in the urethra is so highly depleting to the mucous membrane that it not only retards cure but prevents it. Almost no gonorrhea lasts so long as the case in which hypertonic solutions have been held in the urethra.

Good treatment is, therefore, that type of treatment which brings about an early stage of decline exhibiting no interruptions. As has been pointed out, the use of astringents is the one exception, for, while they bring about a very early stage of decline, it is at the expense of the true immunity processes. They hold them in check as long as they are used, and usually prevent bacteriolysis in the urethral follicles and the submucosa. They favor deep colonization and longevity of infection. Too much cannot be said against their use during the presence of the gonococcus.

For many years it has been the custom to consider certain forms of diet as determining factors in turning the course of gonorrhea in an untoward direction. Just how this was supposed to happen is hard to tell. How the consumption of fried foods, salty foods, sour foods, game, shellfish, asparagus, etc., could make gonorrhea worse and more prolonged is impossible to say. Probably the

truth is that they have absolutely no influence upon it except that they make its possessor a happier and better nourished patient. The thought has been as great a misfortune to countless patients as it likewise has been a good pseudo-explanation for some gonorrheas that were not conducive to therapeutic pride. With the exception of alcohol, ingested substances apparently have no action upon gonorrhea for either good or bad. This is not a haphazard statement, but is based upon years of observation.

The unfavorable response to the ingestion of alcohol is one of the most constant features of the disease. There seem to be no patients who can drink alcohol in any quantity during an attack of gonorrhea and have it run a mild, regular course. During the subsiding stage the drinking of alcohol will, within a few hours, stir the disease into renewed activity and, if repeated at intervals, so depress immunity efforts as to prolong the infection indefinitely.

What has been said of alcohol can be said with probably equal force of sexual excitement with or without coitus. Patients at times are seen who subject themselves once to great excitement, or even coitus, without producing an exacerbation of symptoms, but they rarely repeat the procedure without cause to regret it. A strange but highly fortunate circumstance is the fact that nocturnal emissions rarely make any change in the clinical course, unless there is a gonorrheal seminal vesiculitis. So constant is this that the occurrence of a mucosal toxin response following such an emission is highly diagnostic of this complication.

The future probably will give us a true specific for the cure of gonorrhea, and there are resons to believe it will be found in fields that long have lain fallow. The entire picture would suggest that when the real specific for gonorrhea is found it will not be of the nature of a chemical germicide. It probably will be of a biochemical nature, and will get its power from its ability quickly to stimulate the tissue processes. To be of most use it should produce

cure well within three weeks, for unless it does so it will not be of such value to the female as to the male. The influence of menstruation upon gonorrhea in the female is much the same as that of sexual excitement or alcohol in the male. It is, however, more prolonged, for which reason it more surely favors chronicity of infection. Unless we are able to find a form of treatment that will effect a cure between menstrual periods in the female, or that will produce cure in spite of menstruation, we shall have gone only part of our journey.

The solution of the problem is more likely to be found in the laboratory than in the output of the manufacturing chemists. These latter we have followed with child-like credulity for far too long. They have had merely to produce something that killed the gonococcus in the test-tube, and attractively advertise it, to find a market for their "cures." Considering that distilled water, Ringer's solution, normal salt-solution, and almost anything but good culture-medium of just the right hydrogen-ion concentration will kill the gonococcus, it is obvious that the advertising is of paramount importance.

If we would conquer this perhaps most prevalent of all diseases, we have much ground to cover. We must know far more about the disease itself, and just what processes occur in the urethral mucosa that make for cure. We must know more than we do about the body processes occurring in gonorrhea, and we could learn much from a re-study of the gonococcus in culture. There are definite gaps in our knowledge of the minuter causes of what have been termed herein the toxin responses of the disease, the function of phagocytosis, the rôle of absorbed antigenic substances, the means whereby the deeper-lying gonococci are destroyed, the true effect of our medicaments upon the gonorrheal mucosa, why hypertonic solutions perpetuate infection, and a host of other things of equal, or possibly greater, importance. Until we can more satisfactorily answer some of these questions we are hardly likely to

find the desired specific, for, if it is to be an accidental find, it probably would have been discovered long ago. The indications are that it will come as the result of the most careful study of many of the things mentioned. It may be just around the corner or it may be years away, but its importance to the human race will be beyond price.

XIX. HYGIENE

Though this subject has received some previous consideration, it will not be amiss to repeat or add to it. For years it has been the custom so to limit the diet and activites of those suffering from gonorrhea that they were an open book to the sophisticated and an enigma to the pure-minded, who knew only the paths of virtue. So well does the laity know the usual prohibitions in this regard that to follow them is to remove much of the secrecy from such infections.

A close scrutiny of these restrictions at least raises the suspicion that some of them have been needless and most of them have been foolish. While they, of course, were not devised as such, they are largely medical excuses. They serve to cover up a lack of knowledge regarding the disease and its cure. It is so much easier to attribute unfavorable symptoms to the eating of fried foods than to find the real reasons for them. It is doubtful if any one seriously thinks that fried foods could really influence the course of gonorrhea, or that, under present culinary customs, any one goes through an attack without consuming them. Yet this idea, along with others equally ridiculous, is still used to explain occurrences during the course of the disease that unquestionably are due to other causes.

While we are brushing aside foolish restrictions, let us narrow down to only those that are really of value. For a number of years the writer has placed but two restrictions upon his patients, and has had no cause to feel that more were necessary. He has interdicted only alcohol and all forms of sexual excitement. Except for these, he has not curtailed the patient's activites or indulgences in any way. In other words, the effort has been made to place

the blame for untoward occurrences in the course of gonorrhea where it really belonged, and not quiet the mind by parading a number of excuses such as laxity toward countless restrictions that no one need carry out.

It has been pointed out elsewhere that gonorrhea of itself follows several moderately fixed trends, and that these are interfered with by only a few things. Of these few the most common and most important ones are alcohol, sexual excitement, and injudicious treatment. It will be seen in the charts of the usual courses of the disease that the lack of personal antibody formation or, as we call it, "resistance," is not often a factor. When it is, it is evidenced by a prolonged continuation of the same clinical condition and, except with the advent of definite complications, is not characterized by sudden changes in the objective symptoms. On the other hand, the use of alcohol, indulgence in sexual excitement, or the carrying out of injudicious forms of treatment cause the disease to follow an erratic course with recrudescences of symptoms always within twenty-four hours of the indiscretion. It requires but little observation to bring out the proof of these statements.

Regarding the curtailment of physical activities we have also been rather extreme, for, after the first two weeks of the disease, it is probable that only the more strenuous forms of physical activity have any influence upon gonorrhea, and that even they usually have but little. During the very florid stage there is reason to believe that great and strenuous activities do at times promote gonorrheal spread. There is at the same time good reason to believe that rest in bed during this time has no marked influence upon the usual course of the disease. Its seemingly beneficial results are to be attributed to the better conduct it promotes.

The saner view of the entire question is to interdict alcohol and sexual excitement, ourselves avoid those forms of treatment that are not best at the times they often are used, advise against

the more strenuous forms of physical exercise, and not further annoy the patient with restrictions that he can not and will not observe.

The deadly effect of soap upon the gonococcus should be brought to his attention. He should be instructed to wash the parts with soap and water, and always to wash his hands with a good lather after handling these parts or infected dressings. If this precaution is carried out, conjunctival infections will not occur.

Instructions as to the type of dressing for the penis should be given, as no dressing that limits proper urethral drainage is a good one. Except in true epididymal infections, the use of suspensories should be optional with the patient. It is difficult to see how they could have any influence whatever in limiting the spread of the infection to the epididymes. This is caused by other things than the position of the testes.

XX. ORAL MEDICATION

There is a decided question, as has been previously pointed out, about the value of drugs by mouth in the treatment of gonorrhea. It is really hard to see how they would exert much influence upon such an infection, and year after year their use is decreasing. Most of them are rather of the nature of placebos, and as such may do more harm than good. Human intelligence has reached a plane where the physician generally can do best by being perfectly honest with his patient. He does not need to pour useless things into the stomach to make the patient feel that much is being done for him, and does best to center attention upon the local attack of the infection.

The adherence to oral medicines in gonorrhea has been based upon a number of factors that have little to support them from a scientific standpoint. The arguments for them have changed from time to time until there is little left that really supports their use. That the balsamics render the urine bland may have some little truth in it, but it is not greatly in evidence that this is much needed after the first two or three days. As a matter of fact, such an effect should be more effectively gained by greatly increasing the fluid intake. By this the solids in the urine should be so highly diluted that they would cause a minimum of irritation.

Of the balsamics that have hung on most tenaciously are sandalwood oil in 5- to 10-minim doses, or the old-fashioned Mistura Copaibæ Composita of the National Formulary. The former causes nausea and flatulence, and often much pain in the kidney regions. The latter, popularly known as Lafayette's mixture, causes fewer digestive symptoms, and is generally better borne. Patients occasionally will be seen who have little or no discharge while taking balsamics, but in whom the discharge recurs if they

are discontinued. This is one of the many unexplained things in gonorrhea. In them the balsamics do little more than temporarily hide the evidences of the disease, for it is not shortened thereby, in fact, such patients are generally the victims of prolonged attacks. They furnish much argument against reliance upon the balsamics as a means of cure in gonorrhea.

The so-called alkaline diuretics, potassium acetate and citrate, long have enjoyed much reputation. They cause little, if any, change in the urinary reaction, and as diuretics they are greatly inferior to water.

Aside from the fact that oral medication offers little in regard to cure, reliance upon it is prone to arouse an indifference that is a distinct menace to the patient himself, as well as to society in general. Gonorrhea is far too serious in its consequences to have its treatment delegated to the patient. He has not the training to make him a good judge of what is best for him and, after he revives from the mental depression of the first week, he is hardly likely to view his disease with sufficient gravity. It safely can be stated that the less often the patient sees his physician, the less seriously will he take his disease. No form of treatment that allows of long periods of freedom of contact between patient and physician will keep patients sufficiently interested in the disease to pursue its treatment to the point of cure. They often are only too glad to assume themselves cured, and to such an attitude may be attributed many of the unfortunate infections of women.

If, therefore, one is going to try and treat gonorrhea by oral medication alone, he must expect half-hearted co-operation upon the part of the patient and only those cures that he would obtain if he did nothing. He must expect practically 100 per cent. of posterior urethral involvements, and should not discharge anyone as cured until he has carried out treatment to cure the gonorrheal prostatitis that is a concomitant as well as an aftermath of all posterior urethral infections with the gonococcus.

XXI. A DISCUSSION OF THE SUBSTANCES USED

The use of a number of different plans of treatment for the same disease usually means that no one plan is greatly to be relied upon. In this regard gonorrhea is a notable exception, for, of the countless forms of treatment, many of them are good if properly used. It is the improper use of many of them that has done so much toward discrediting them. Just how a thing is used is of as much importance as just what is used. The greatest errors seem to have arisen from not knowing just what the form of treatment adopted should accomplish, and from attributing failures to the virulence of the infection or to lack of resistance on the part of the patient. Much space has been given to a discussion of these several subjects, and it is well here to confine ourselves to a discussion of the treatments most in vogue today. An effort will be made to bring out their good points and the reasons why they have not produced better results.

The writers of text-books upon gonorrhea always have been at a disadvantage. They have found themselves under the necessity of outlining almost every plan of treatment that was supposed to possess any merit whatever. The result has been to produce an array of things that serve to confuse the reader and to encourage him to change from plan to plan without giving any one plan a real opportunity to produce results. There is a crying need for greater simplification in this regard. The multiplicity of substances used is certainly needless, particularly when it is realized that we are trying to stimulate certain tissue processes, and that great tissue penetration or bactericidal properties are matters of minor importance—perhaps of no importance. With considerable safety one can narrow down the really valuable substances that we use today to just a few, and consider the others

as overload or as members of such closely allied groups that they possess no real advantages over their neighbors, though they may be equally as efficient.

Permanganate of potash should perhaps take the lead of any of the substances that are used in the treatment of gonorrhea. Since its adoption as an urethral injection for gonorrhea by Rich and Van den Corput in 1864, and its popularization by Janet in 1889, it has been the one chemical about which we have gravitated. We have left it at times for the lure of other things, but we have constantly returned to its use. The history of medicine shows that we seldom return repeatedly to utterly useless things, and the fact that we have returned to permanganate of potash so many times stands as an indication of its value. It long has been considered by many of our most thoughtful urologists to be the most valuable substance we have for the local treatment of gonorrheal urethritis. Just how it exerts its beneficial influence is not easy to say, but no one who has used it carefully and gently can doubt that it produces a very valuable urge toward cure. So commonly does one see severe gonococcal infections controlled by its action that it probably would be abandoned with more regret by a large number of urologists than would the sum of the other substances we use. Used, as it should be, in strengths up to 1 : 5000, its bactericidal value and its so-called astringent properties are rather insignificant. Such being the case, its action must be ascribed to other causes more in conformity with the views repeatedly expressed herein.

Next in order of importance come the various organic silver salts. These are so numerous that their naming would be next to impossible and useless. Certain ones stand out beyond the others for various reasons, but it is probable that their power for good does not greatly differ. Some have been widely advertised and are consequently much higher in price, though probably no better than those that have not received commercial attention

to an equal extent. For instance, the silver salt, commercially known as nucleinate of silver, will give just as good results as one of its near neighbors of twice its cost. Its solutions look the same, and apparently act the same. Its one drawback is its color and staining possibilities, but its power for good far outweighs these.

Protargol is a much cleaner substance and is said to be slightly more stimulating to the mucous membrane. For this reason it has gained the reputation of being particularly indicated in conditions of prolonged latency or chronicity.

Neosilvol is much more expensive than either of these, and, so far as the writer has been able to determine, its chief claim for superiority over them rests in the fact that it is cleaner and practically does not stain fabrics. In some cases of non-specific urethritis it acts almost as a specific. It also has been observed to exercise a very highly beneficial effect in those patients who reach an apparently stationary stage while being treated with silver nucleinate. In them the substitution of neosilvol commonly brings about marked improvement for a while. They, however, soon reach another stationary period from which the resumption of treatment with silver nucleinate carries them on to cure.

Argyrol closely resembles silver nucleinate and apparently has no advantage over it.

Albargin, argentamin, largin, and the others have received very little attention in this country, and are probably so similar in their actions that they exhibit no advantage over the others mentioned.

The chief criticism that can be raised against the use of the organic silver salts is the general tendency to use them in too concentrated solutions. One can demonstrate with ease that the stronger solutions occasion a purulent response far greater than is desirable. Comparatively few urethral mucosæ do so well after the use of 10 per cent. solutions of silver nucleinate and

argyrol, or 1 per cent. protargol, as after half the strengths mentioned.

Perhaps of as great importance is the method and frequency of their use. Used with gentleness, and not more than twice in twenty-four hours, they are invaluable aids to treatment. Too frequent use of any medicament in the urethra tends to have a devitalizing effect upon the mucosa and does not give nearly such satisfactory results. In fact, there is much reason to believe that much better results often are obtained by a single treatment in each twenty-four hours. The writer has tried many such treatments during the course of twenty-four hours, two treatments and one, and is strongly in favor of one treatment.

Acriflavine and mercurochrome-220 have been rather highly extolled in the treatment of gonorrhea. They do not seem to have changed the general picture of the disease. The prolonged serous discharge, so commonly seen after the use of the former, is probably more a matter of the strength of the solutions used and the frequency of their use, and consequently is preventable. It is probable that few, if any, urologists use mercurochrome-220 in acute gonorrhea today. Together, these two substances offer an exceedingly strong argument against the value of potent bactericides in the treatment of the disease.

Silver nitrate for many years enjoyed a very wide reputation as a means toward the cure of gonorrhea. Of late it has received but little attention. There can be little doubt regarding its value, particularly as a mucous-membrane stimulant in subacute and chronic infections. Its chief abuse has been, as with the others, in strength of solutions employed. Used in solutions of 1 : 10,000, it generally gives a tissue response comparing well with the aforementioned substances, but in greater concentrations it is prone to have a depleting effect upon the mucosa through overstimulation. Its obvious disadvantages make its use in acute gonorrhea less desirable than the far milder organic silver salts.

From the countless errors that have been made by patients and physicians in the injection of strong, and even caustic, substances into the urethral lumen during acute anterior gonorrhea, it is evident that they have no value as tissue gonococcicides. The writer has had an opportunity to study cases after injection of tincture of iodine, about 1-200 bichloride of mercury, saturated solution of potassium permanganate, and 10 per cent. zinc chloride, and found gonococci flourishing after the intense inflammatory reaction occasioned by such treatment blunders had subsided. He also has found gonococci in the secretion from a juxta-urethral sinus a week after it had been distended with 50 per cent. silver nitrate solution, and has seen them quickly disappear from the same sinus upon the use of 5 per cent. solutions of silver nucleinate. Surely this is significant.

Astringents have been mentioned, but one cannot refrain from giving them further condemnation. They as a class represent the most useless of efforts toward cure, while their fixed tendency to hide gonorrhea makes them a great therapeutic menace to society. They produce a mental quietude in the midst of infection that is conducive to sexual experimentation upon the part of the patient. To their use can be attributed more transferences of disease than to any other class of substances used.

After some years of observation of the results obtained by these medicaments, the writer has gained a number of impressions as to their comparative values and the best means of using them which it might be useful to state. These are personal impressions, and may not be in entire accord with the experiences of others, but they have served as safe guides:

1. The best single chemical that we now use is potassium permanganate in proper strength solution.

2. The next best for general use is silver nucleinate, the commercial preparations of which have given equally as good results as their more expensive near-twin, argyrol.

3. Then comes protargol, which is slightly more stimulating than silver nucleinate, and finds its best place in cases that are slow in developing the proper tissue response.

4. The other organic silver salts may, in other hands, give equally good results. Some have much to recommend them from the standpoint of cleanliness.

5. The silver salts give far better results if applied to a mucosa from which its coating of mucus has been washed. For this purpose the writer first uses an irrigation of 1 : 5000 permanganate of potash solution.

6. Those strengths of solutions that cause a slight urethral discharge for a few hours following their use give the best results. With permanganate this is about 1 : 5000, with silver nucleinate, 5 per cent., and with protargol, 0.25 to 0.5 per cent. In the hypersensitive urethra greater dilutions at times may do better.

7. Nothing is gained and much is lost in the use of stronger solutions. It safely can be said that any solution that causes great urethral burning and a profuse purulent response is too strong.

8. The use of astringent injections when the gonococcus is present is directly opposed to Nature's most valuable defensive processes.

XXII. A DISCUSSION OF THE METHODS USED

The methods used in the treatment of gonorrheal urethritis in the male have given ground for more just criticism than have the substances employed. Many of them have been directly opposed to our pathological knowledge, and have done much to prolong the disease. Their application has been such as to produce trauma at a time when the diseased tissues were least able to withstand it. The need for gentleness has never been sufficiently stressed, and procedures that should have been reserved for the late stages of gonorrhea have been used freely from its beginning. So many of the best methods have been used in such a faulty way as to cause their abandonment by a large proportion of those who treat the disease. Because of these faulty ways of using good therapeutic measures, many less valuable means of treatment have received a degree of endorsement that they little merited while the better ones have been neglected.

So true is this that there is need for a revaluation of methods of treatment with their traumatizing elements removed. The one thing that has cast discredit upon some of the best of them is the direct injury they produced in the way they were used. There are few things that stand out so boldly as the fact that the urethral mucosa is very poorly equipped to stand any injury whatever while it is acutely inflamed. We have seen in our studies of the effects of trauma to the urethra during the presence of the gonococcus that there is not only an almost immediate response to even mild grades of it, but that the repetition of such insults retards or checks all advance toward cure. Few things are more easily demonstrated than this, and yet it has become the custom to pass catheters, or other instruments, over this delicate mucosa during acute gonorrhea for the purpose of treating it locally. Obviously

such a thing can never be done with sufficient gentleness to avoid injury, so that it evidently is not a good procedure to insert any solid body into the canal in acute gonorrhea, even though it be the softest rubber catheter.

HAND INJECTIONS

For several very good reasons, the use of hand injections in the treatment of acute gonorrhea has fallen into considerable disrepute. They have received the condemnation that any form of treatment that is carried out entirely by the patient is sure to get. Much of their failure is due to poor instruction upon the part of the physician. He has satisfied himself with writing for some antiseptic and a syringe, and telling the patient to give himself an injection at certain intervals. With such meager instructions it is but natural that he should reap all of the complications that excessive roughness in the shape of high intra-urethral pressures could give to a generally pus-filled urethra.

Fig. 34.—The safest type of syringe for urethral injections.

There is no doubt regarding the great value of properly used injections in the treatment of anterior urethritis, but no patient should be entrusted with them unless he really has been shown how to use them. If he is of sufficient intelligence to be properly impressed with the importance of his disease, and knows how to give an injection without harming himself, there can be no great objection to his doing so.

He should be told to void urine immediately before giving his injection, and never to use any more force in introducing the solution than is required to gently balloon the anterior urethra. He should use a glass syringe with a rubber bulb rather than a piston.

It is best to acquaint him with the early symptoms of posterior urethral involvement, and instruct him to discontinue his therapeutic efforts immediately if any of them develop.

HYDROSTATIC IRRIGATIONS

The present unpopularity of hydrostatic urethral irrigations in many quarters is due to the method of their use and not to the

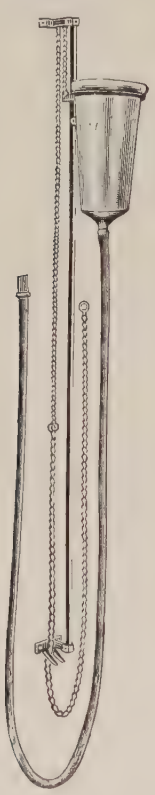


Fig. 35.—The safest and most convenient type of apparatus for urethral and intravesical hydrostatic irrigations.

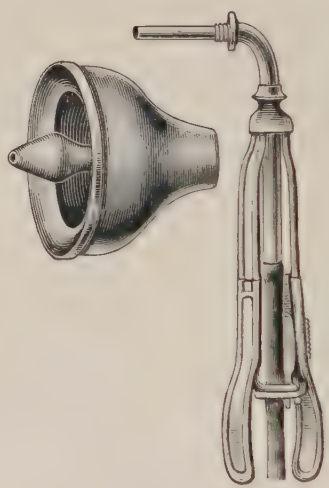


Fig. 36.—Eaton urethral irrigating cut-off with the author's non-splash nozzle.

substances used. No pressure is easier to control than hydrostatic, but very little effort has been made to control it. Certainly one would not expect an acutely inflamed urethra to behave well under

the pressure of a column of 5 or 6 feet of fluid. The complications thus caused have tended to discredit this immensely valuable method of treatment. Such complications would not have followed the pressure of a column of fluid of no more than 2 or 3 feet above the urethral level. In other words, the reputation of the irrigation has suffered from the foolish, bungling way in which it has been used.

EARLY INSTRUMENTATION

There are also those whose fingers seem to itch to pass instruments into the gonorrheal urethra. The result of this obsession is that long before the mucosa is in a condition to stand such an insult it is brutalized by sounds, dilators, or instillating syringes. The infection is spread into the countless smaller mucous channels of the tract, where it colonizes and accounts for so many of the recurrences of gonorrhea. It takes but little careful clinical study to demonstrate conclusively the great harmfulness of such procedures, and to show that the vast majority of the chronic cases of gonorrhea have been thus mistreated. The same could be said of the medicated urethral bougies. Though these have fallen into rather general disrepute there are still those who advise them. It is very rare to see a patient, who has been using medicated bougies, who has not marked pathology of the anterior urethra as the direct result of his treatment efforts.

DIATHERMY

Under the mistaken idea that the gonococcus is quickly killed by a temperature of 106° F., many efforts have been made to cure gonorrhea by the general or local elevation of tissue temperature. A number of years ago the Germans did a great deal of work along these lines by keeping the patients in hot baths until they elevated body temperature. Beyond the fact that some of the patients died from the treatment itself, aimed at curing a disease

that almost never is fatal in the male, practically no results of value were obtained.

Of late, the endeavor to raise the temperature of the infected parts by means of electrically produced heat, "diathermy," has attracted great attention. At first this was done by passing one pole of the high-frequency current into the acutely infected urethra and placing the indifferent pole elsewhere on the body. Through the failure of this and the complications produced thereby, the treatments are now carried out in acute gonorrheal urethritis by the obviously ineffectual method of clamping the penis between the two electrodes. Were it possible to kill the gonococci in the tissues by this method, only those in the pendulous portion of the canal would be destroyed and those left in the deeper portions of the urethra would immediately resow the soil. The impossibility of applying the heat to the entire area infected gives in itself little promise of success.

That the gonococcus in culture will survive thirty minutes at a temperature of 113° F. gives little promise of cure through direct killing of gonococci in the tissue. The good results that have been reported are hardly likely to have been due to other than tissue change as the result of the applied heat. The more one sees and hears of these supposed results, the less enthusiastic will he be regarding the use of diathermy in acute gonorrhea.

Introduced on a wave of enthusiasm, the method largely has been abandoned as a cure for acute gonorrhea by those who praised it most highly. They now admit that it is almost useless in acute infections, but claim that it is useful in cervical and tubal infections in the female and in circumscribed infective areas in the male. Considering that circumscribed gonorrhea in the male is practically limited to the epididymis, with the occasional exception of the seminal vesicle and prostate, it will be seen that it has rather a narrow field of usefulness.

Regarding its use in epididymitis it is hardly likely to supplant

older and safer methods. If one can reason from the effect of the same amount of diathermic elevation of temperature in animals, it is not without danger. Belfield has shown that it at times produces atrophy of the testicle in rabbits. Such a possibility in the human should cause much thought and engender the exercise of great care and caution.

XXIII. THE TREATMENT OF ACUTE ANTERIOR URETHRITIS

Approaching the battle against gonorrhea, let us consider briefly exactly what we are trying to do, for lack of clear realization of this in the past has led far afield. Primarily we are trying to help a poorly equipped mucous membrane to rid itself of a bacterium that has found its most favorable place of abode. This mucous membrane enjoys almost no natural protective powers, and is, as a rule, slow in developing them. In most cases it would develop these powers eventually and rid itself of the disease, but experience has taught us that by the careful use of certain remedial measures we can hasten these processes. Not only can we hasten them, but we can create them in those patients whose mucosæ would develop them with extreme slowness.

We should not enter the fight with the idea that we are the killers of gonococci, as has been pointed out, for the ones we directly kill are generally the ones that would be carried from the canal by the leukocyte. The ones that cause the continuation of the disease are safely placed where they can escape our attack.

Stripped to the ultimate, what we are trying to do is to promote the bactericidal and bacteriostatic properties of one of the most delicate mucous membranes of the body. Of the utmost value in this regard is free drainage, and anything that retards drainage from the large or small associated channels tends to prolong the disease.

We must realize that our present plans of treatment are probably only temporary makeshifts. They are temporary in the sense that when we turn from our dreams of that ideal antiseptic for a disease that probably does not need it, we shall have some hope of finding that other substance that quickly produces tissue resistance, rather than slays a few bacteria already on the decline.

In many quarters it has been the custom to delay the local treatment of acute gonorrhea until the florid symptoms have subsided. If one is naturally rough and heavy-handed this is a very good plan, as it avoids much pain and danger for the patient. If, on the other hand, one can be gentle, much time is lost by this waiting, and many posterior urethral infections will result that could be prevented by the institution of immediate treatment. Considering that posterior involvement adds at least three months to the duration of an attack of gonorrhea, and is a distinct misfortune, any plan of treatment that even slightly reduces its occurrence is of great value. By the elimination of everything from one's plan of treatment that could in any way devitalize the urethral mucous membrane, and the securing of the strict co-operation of the patient, the text-book incidence of from 40 to 99 per cent. of such posterior involvements can be much reduced. If local treatments are intelligently and carefully carried out at once, there is little need of posterior urethral involvement in more than 15 per cent. of those patients seen during the first four days of the infection. The greater the time elapsing between the onset of the disease and the institution of local treatments, the greater will be the percentage of such disease extension.

The plan of treatment here outlined has given the writer in over four years less than 15 per cent. of posterior urethral extensions in the patients seen during the first four days who co-operated even fairly well. In order to avoid confusion a description will be given from the earliest days of the disease to its completion in the usual cases. The indications for variations from the routine will then be considered, as well as the handling of such complications as may arise. The aim will be simplicity and continuity, for a great fault of the descriptions of treatment is the endeavor to mention everything that could be done for the disease. One is much better equipped to combat gonorrhea if he knows thoroughly one simple effective plan of treatment, and what to expect

of it, than if he knows a little about many plans. A little knowledge of many forms of treatment has perhaps done more to produce chronic gonorrhea than all other factors.

To be productive of the greatest good to the greatest number, any plan of treatment must be simple and easy to carry out. It must require nothing that is not found in even a moderately well-equipped medical office, or that is not easily obtainable. It must not place too great a burden upon the patient or, if it does, it must hold out a prognosis commensurate with this burden as compared with other plans of therapeutic attack. It should be free from pain and give a minimum of discomfort.

The treatment that has given the writer such good results complies with all of these requirements. Particularly does it offer an attractive prognosis and, as his experiences with it accumulate, it is becoming increasingly evident that interruptions to the smooth course of the disease are due almost entirely to misconduct or indiscretions upon the part of the patient. Such being the case the patient's co-operation is deemed equally as important as the local treatment, and much effort is expended in impressing him with the immense value of a careful mode of life wherein alcohol and sexual excitement have no place. He is not asked to restrict his diet, but is encouraged to drink more water, get more rest, and avoid the more strenuous physical exertions if possible. This latter, however, is not really insisted upon.

The particular plan of treatment that has given the best results is, briefly, as follows:

The patient voids urine and, with a water-pressure of not more than $2\frac{1}{2}$ feet above the urethral level, the *anterior urethra only* is copiously irrigated with warm 1 : 5000 potassium-permanganate solution. In doing this, the urethra is digitally blocked at about 2 inches from the meatus until this distal section of the canal has been thoroughly washed, after which the entire anterior urethra is washed. At no time is the irrigating nozzle held against the

meatus long enough to give the urethra the full pressure of the fluid; it is only allowed to dilate it in the gentlest way. The aim, certainly during the florid stage, is never to raise the intra-urethral

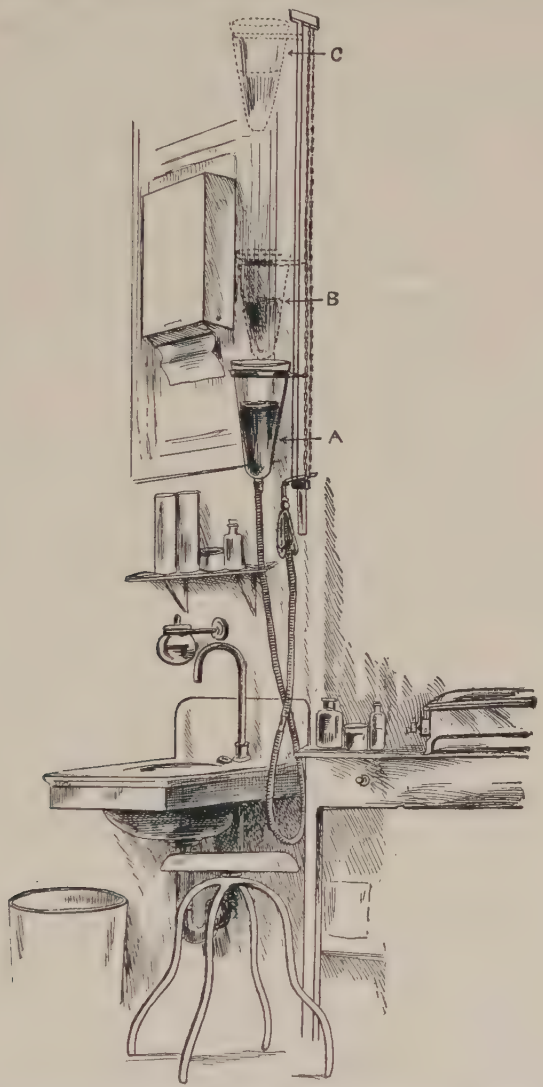


Fig. 37.—Author's treatment outfit. Patient stands in front of the basin, which is placed lower than the average basin height: A, Position of jar for anterior irrigations; B, position of jar for posterior irrigations; C, dangerous pressure for gonococcal urethritis.

Fig. 38.—The shaft of the penis is firmly compressed between the middle and ring fingers until the distal portion of the anterior urethra is cleansed by the irrigating solution.

Fig. 39.—The compression of the middle and ring fingers is then released and the entire *anterior* urethra is irrigated.

pressure more than a patient with a full-sized external urinary meatus does in the act of urination.

The urethra is then allowed to free itself of any retained permanganate solution, and is gently filled with a 5 per cent. solution of silver nucleinate, which is retained for five minutes or longer, depending upon the amount of discomfort it gives the patient.

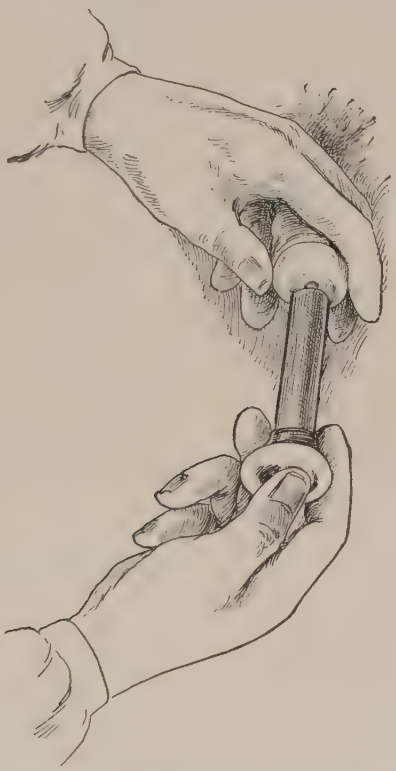


Fig. 40.—Method of filling the anterior urethra with solution to be retained.

To protect the clothing and make the retention of the solution easier for the patient, a layer of absorbent cotton, $1\frac{1}{2}$ by 6 inches, is clamped over the penis by a wire clamp. The ordinary wire test-tube holder, with a good spring, does very well. A much better instrument, however, is the writer's penis clamp. This solution then is allowed to drain out into the cotton, a clean strip

of cotton is placed over the organ and held by a sanitary bag, or a No. 10 rubber band. If the rubber band is used to retain the cotton dressing, the patient is instructed not to replace it after the second urination following his treatment. Care is taken

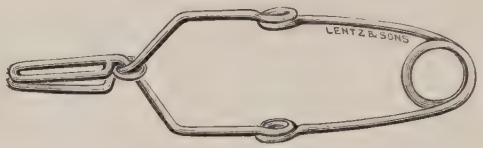


Fig. 41.—Author's penis clamp.

to see that he follows this instruction and does not use the rubber band continuously.

This treatment is carried out once daily for two weeks, when it is found in most cases that the patient has no discharge, and, if he is allowed a forty-eight-hour interval, the discharge either does not recur or, if it does, it does not do so until after about thirty-six hours. If it does recur, the daily treatments are resumed for an-

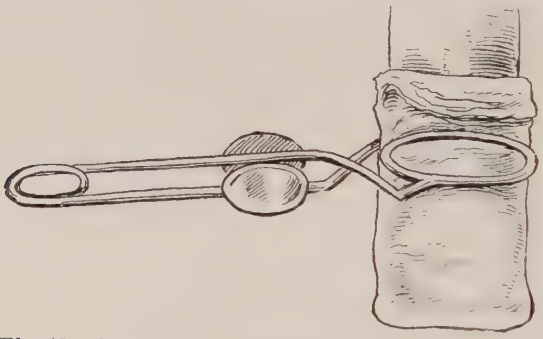


Fig. 42.—Method of retaining solution in the urethra.

other week, when it generally is possible to give a treatment upon alternate days without recurrence of discharge. These treatments are continued until such time as it is felt that the patient has conquered his infection, whereupon he is allowed to go several days without any treatment whatever. He is given glass slides to collect any morning discharge that may appear. If when he returns there is no evidence of the disease, he has had no urethral discharge,

Fig. 43.

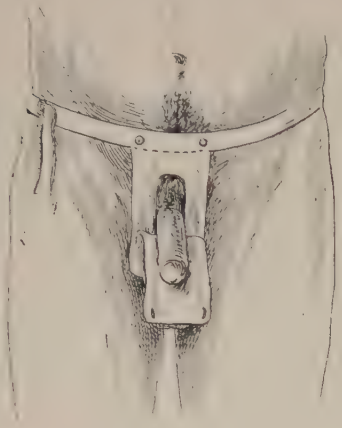


Fig. 44.

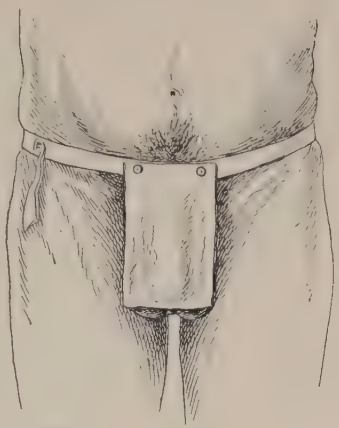


Fig. 45.

Fig. 43.—Temporary cotton dressing held lightly by rubber band.

Fig. 44.—Sanitary bag. This is the most satisfactory penile dressing. In the bottom of the pouch can be placed cotton or, preferably, gauze. If sufficient of either is properly used drainage is not interfered with and the clothing is well protected.

Fig. 45.—Sanitary bag closed.

Fig. 46.

Fig. 47.

Figs. 46, 47.—Old butterfly type of penile dressing. This dressing is not sufficient to prevent the soiling of the clothing where colored solutions have been injected into the urethra. It is a satisfactory dressing for the collection of urethral discharge, however.

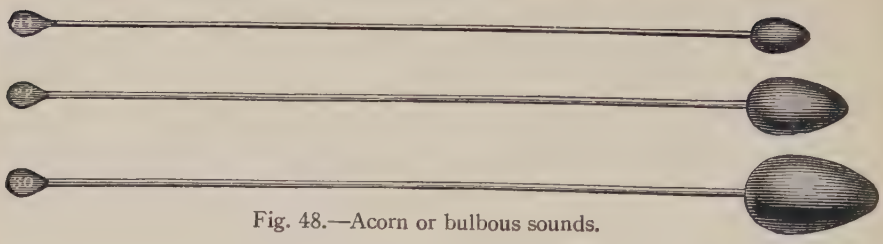


Fig. 48.—Acorn or bulbous sounds.

Fig. 49.—Urethral massage with bulbous sound to stir up any latent infection. It is carried to the depth of the distal instrument on the first effort, and to that of the more deeply placed sound on the second effort.

and his urinary sediment is free of pus and gonococci, an acorn sound of the size of his meatus is passed to the *penoscrotal angle*, and he is instructed to collect any secretion that may appear at the meatus for microscopic study. If he still remains negative,

the acorn sound is passed to, but not beyond, the *bulbomembranous junction*. If this occasions no recurrence of discharge, a regular urethral sound is passed to the bulbomembranous junction two days later and the urethra massaged upon it.

It is to be noted that no instruments whatever are passed into the urethra until it is felt reasonably certain that the gonococcus

Fig. 50.—As a final instrumental effort to reveal any hidden foci of infection a regular urethral sound is passed *to the bulbomembranous junction* and the canal is digitally massaged upon it.

is no longer present. At this time they are used primarily to stir up any latent, hidden infection, and secondarily as a prophylaxis against stricture formation. They are not used within less than four weeks of the development of the disease. An additional safeguard at this time is to give 0.5 c.c. of stock gonococcic vaccine, for it, too, has the power to light up dormant foci. If there is the

least suspicion that the gonococcus is still present, it is well to avoid too large a dose of vaccine, for it at times has the power so to influence immunity processes that a recurrence of discharge thus occasioned may continue for a long time. Because it is possible for gonorrhea to extend into the posterior urethra without either the patient or his doctor discovering it at the time, the prostate is massaged without the use of any irrigation before or after. If such an infection has occurred, this almost invariably will cause a recurrence of discharge.

The gonococcus fixation test, as it is done and interpreted, offers so little as a proof of cure in these cases that it is not used.

Responding negatively to these tests the patient is told that he probably is cured, but that, since doctors sometimes err, *he must not indulge in coitus for three months without the use of a condom*. If his gonorrhea has not recurred in that time, it never will recur, and if it has, he at least will have avoided the infection of others.

Such will be the course of the disease in the great majority of patients under this plan of treatment instituted early in the disease who carry out the usual hygienic instructions. From time to time patients will be encountered in whom the course of the disease is not so short nor so smooth, for there are those, generally blonds, in whom, though the disease does not extend to the posterior urethra, it seems to remain long in a stationary condition, getting neither better nor worse. In at least 75 per cent. of these, it will be found that the administration of a gonococcic vaccine in very small doses, as advised in the chapter on Vaccines, will give the urge that leads to cure. Such an use of vaccine in these stationary cases usually will change a cloudy first glass of urine to a clear one, with but a few shreds, and cause the entire disappearance of discharge at the meatus.

To return to the general plan of treatment, it will be found at times that a slight reduction in the strength of both of the substances used will exercise a more favorable effect. Consequently

it is well to try such a reduction as soon as the given case fails to improve. Should the reduction of the strength of solutions used, or the small doses of gonococcic vaccine fail to exercise the desired effect, it is a good plan to use permanganate of potash alone, or to substitute 5 per cent. neosilvol solution for the silver nucleinate for three or four days. Strangely enough, this chemical seems to exercise a good effect for a short time, but the disease soon reaches another stationary stage from which the return to silver nucleinate carries it on toward cure.

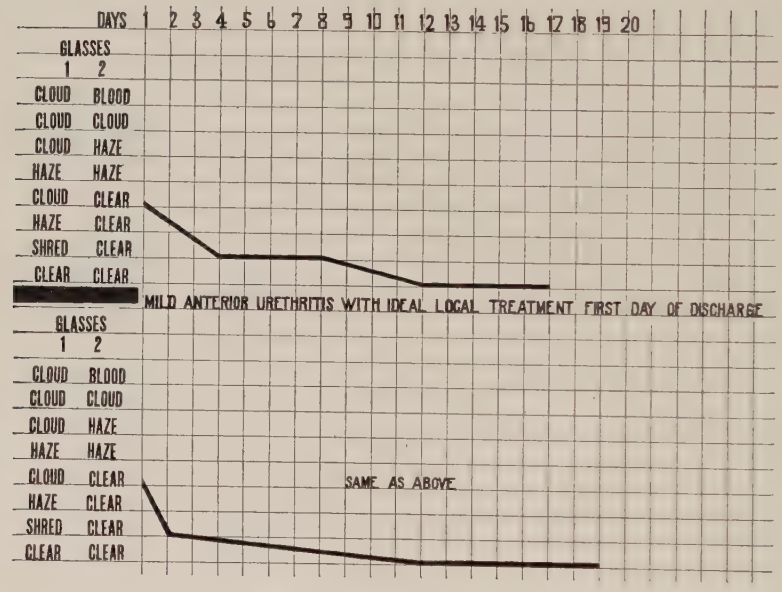
This plan of treatment has been tried both twice a day and once a day, and unquestionably one treatment in the twenty-four hours has been productive of the better results. Used more often, it appears to exert a devitalizing effect characterized by more discharge at the meatus and greater urethral irritation. The same may be said of the later subsiding stages, for just as soon as the patient can go forty-eight hours without a recurrence of his urethral discharge there seems to be a distinct disadvantage in the daily treatment, and the disease then clears up more quickly if the treatment is given every other day.

Throughout the entire course of the treatment until it is felt that the disease is cured, great care is taken to avoid any type of mucous-membrane trauma. The striking, and often brilliant, results obtained by this extremely simple plan of treatment offer incontrovertible arguments against trauma in early gonorrhea, as well as the idea that bactericidal value is a factor in them. It unquestionably produces its results because, in its lack of injury to the urethra, it not only gives the mucosal processes a chance, but it has itself the power to stimulate these functions.

There is no point in withholding treatment because of any meatal edema that may be present when the patient presents himself, for, if one is sufficiently gentle, he will cause no immediate increase in the edema. On the contrary, it usually will be gone on the following day and the urethral discharge will be greatly reduced.

In the accompanying chart are presented the average urine trends obtained by this extremely mild plan of treatment. The precipitous drop in the charted line is rather characteristic. Shortening of the peak of the curve, as we have seen (excepting from the use of astringents), is a very reliable index of the efficacy of the treatment used. Under the suggested course of treatment generally

CHART IX



occur the shortest curves seen. It is also much in evidence that the subsequent period of latency is shorter than under other types of treatment, as it is quite rare to be able to stir such cases into activity after the cessation of treatment by the efforts toward proving cure.

Should one, however, be able to cause a toxin response by the criteria of cure before suggested, the treatment should be resumed as before. The recurrence, as well as the remaining infective focus, usually clear up with great rapidity.

Under this plan of treatment follicular abscesses, cowperitis, or most of the other complications of anterior urethritis never occur.

XXIV. THE MANAGEMENT OF ACUTE POSTERIOR URETHRITIS

If the posterior urethra does become involved, all local treatment is discontinued until such time as there is no longer any vesical discomfort, urgency, or frequency of urination. It is felt that the danger of complications from local therapeutic efforts at this stage far outweigh any good they can do. The patient is made more comfortable by oral sedatives. The taking of 1 or 2 drams of equal parts of camphorated tincture of opium and elixir of sodium bromide, every four hours and at bedtime, generally will relieve much of the discomfort. The patient is not encouraged to make any great effort to control his urinary frequency. Nature, foreseeing the dangers of high intravesical pressures at this time, has so inflamed the trigone as to prevent the bladder from becoming dangerously full. Trying to combat this has caused many cases of seminal vesiculitis and epididymitis.

When the patient entirely *has regained his vesical comfort* an effort is made to give an intravesical irrigation of 1 : 5000 potassium permanganate. In doing this, the irrigating tank is never more than 3 feet above the urethral level. He is instructed to relax, as though he were emptying his bladder, and the fluid is allowed *partially* to fill the organ, after which it is voided. This is carried out several times. Occasionally the patient is unable to relax at the first effort, but it is considered better to try again at the next visit rather than to raise the pressure of the fluid.

These treatments are carried out daily, or every other day, for a week or longer if necessary. If, as happens at times, the urine stays very cloudy, 5 per cent. silver nucleinate is injected into the bladder at the end of the treatment and allowed to remain until the next urination. This is done by means of a glass syringe with

rubber bulb. When the patient relaxes, as he does for his irrigation, it will be found that the solution can be injected into the bladder under very little pressure. If relaxation of the cut-off muscle does not occur, it is best not to use sufficient pressure to force the sphincter, for there are few things so potent as great intra-urethral pressure to produce lesions of gravity.

Too much gentleness cannot be exercised in carrying out these intravesical treatments, and it is often far better to find reasons why they should be delayed than to institute them too early. There is no period in the course of the disease in which such serious complications can occur as during the acute and subsiding stages of posterior gonorrheal urethritis. Too early and too strenuous treatments during this stage account for many of the cases of gonorrhea with permanently damaged urogenital tracts.

One does well to approach these treatments with a feeling that the degree of tolerance of a given patient is an unknown quantity, and that the aim should be gradually and cautiously to try to increase that tolerance to a point where further treatments are possible. Should the prostate gland be large, boggy, and unduly tender, the use of heat twice a day by means of the rectal psychrophore quickly will reduce it. After the first week the thermal treatments can be reduced to once a day, but they seldom need be continued for more than two weeks. The patient should be warned against bruising the gland in the introduction of the instrument, as prostatic abscesses are liable to result from even slight trauma.

Sooner or later there comes a time when one should begin to think of the prostatic involvement that always accompanies gonorrhea of the posterior urethra. In the prostate we have the most ideal conditions for prolonged gonococcal colonization, and unless we take means to eradicate it the disease will linger for great periods of time. It is not always easy to determine just when the gland safely can be attacked, but, on general principles, it may

be said that when there are no vesical symptoms, the second glass of urine is clear, the first glass shows only a faint haze or a few shreds, and rectal palpation shows that the gland is not a swollen, throbbing, hypersensitive structure, no harm will be done if the treatment is sufficiently gentle.

To carry out such treatment one should leave some of the irrigating solution in the bladder after the usual irrigation, and the prostate should be *very gently stroked* from above downward, leaving the midline until last as it is most sensative. Cross-stroking should never be done. Too much care cannot be used in these early manipulations of the prostate. One should confine himself to the slightest form of stroking until he proves that heavier pressure is safe. *Such treatments should not be done oftener than twice a*

Fig. 51.—Eisner rectal psychrophore for the application of heat or cold to the prostate gland. A tube from the fountain is attached to the upper channel. From it a small tube runs to the tip of the instrument which allows the fluid to flow through the instrument from within outward. By attaching a tube to the lower channel and placing its end in a vessel at the bedside, the patient can give his treatments lying in bed.

week. The pressure upon the gland can be slightly increased at each treatment as the prostate becomes less sensitive, but it should never be so great as to cause much pain to the patient.

It is commonly the case that the first few massages will be followed by a recurrence of the urethral discharge. If so, it is best to give an intravesical irrigation for several days and not repeat the massage until the discharge has subsided, which it generally does within two or three days.

Under this method of treatment, carried out with proper care and gentleness, providing the patient co-operates, epididymitis, seminal vesiculitis, and prostatic abscess almost do not occur.

If they do occur, it safely can be said that the patient has performed violent exercise with a bladder full of urine, or has subjected himself to much sexual excitement under like conditions.

One must not expect to get the prostatic secretion free of pus in less than three months after the institution of his prostatic massage, nor is he wise to consider the patient cured until the prostate is well. When this has been accomplished a sound should be passed upon several occasions, as it at times will bring to light a smouldering infection. No instrument should be passed until the previously mentioned tests of cure indicate that the patient probably is well. If no recurrences of discharge can be started, a cure probably has been accomplished, but the patient should be instructed to have no sexual intercourse for three months without protecting his partner by the use of a condom.

Patients will be encountered in whom, after several months of prostatic massage, there occurs a stationary stage in which the microscopic study of the prostatic secretion shows a persistence of pus. These patients do best if the prostatic treatments are discontinued for from six to eight weeks. Usually such prostates respond readily to the second course of massage.

It should, however, be borne in mind that many of those patients who do not respond to massage have posterior urethral lesions that prevent the clearing up of their residual prostatitis. At this stage almost all of them are free of gonococci. In these cases it is well to pass a sound and, if it occasions no recurrence of urethral discharge, a cysto-urethroscopic study should be made a few days later to determine the absence or presence of these urethral lesions. Should they be present prostatic massage should be withheld until after they have been entirely eradicated, as is described under the consideration of lymphocystic urethral lesions.

The use of autogenous vaccines in the treatment of post-gonorrheal prostatitis at times seems to aid, but it is more often quite disappointing.

Such, in brief, is the mode of treatment that, largely through the gentleness of its application, has reduced gonorrhea in the writer's practice to rather a simple disease unaccompanied by most of the complications. Experience with it has amply justified the belief that, with the exception of an incidence of less than 15 per cent. of posterior involvement with its concomitant prostatitis, almost all of the other complications are avoidable. They are usually the products of faulty treatment or conduct. In private practice it generally is possible to obtain and hold the patient's interest in his progress and thus insure his co-operation. Without these the disease generally runs a long, stormy course, no matter how good or gentle may be the treatment.

XXV. A FURTHER DISCUSSION OF TREATMENT

Gonorrheal urethritis is not always seen by the physician during its first few days. Often it is not seen until it has existed for quite a period of time, during which various procedures have been carried out in an effort to cure it. As the patient presents himself, he not infrequently brings with him a number of complications of more or less severity. While these complications may require special treatment, the plan just given can be started at the point appropriate to the disease when seen as determined by a study of it.

In such cases one does well to inquire closely into the history, particularly as regards the remedial measures that have been used, and the particular manner in which they have been carried out. Much good judgment is required at times to determine just what is best to do, and it is well to proceed with the utmost caution. Should such a patient be on the verge of a complication of severity he will not take it kindly if it develops a few hours after a new type of treatment from a new physician. It is, therefore, best to do comparatively little at the first visit, if one would have the privilege of going much further with treatment. With the exception of posterior urethral involvement, which may occur at almost any time, other complications that may be developing will have progressed sufficiently by the following day to permit of a diagnosis.

If in the history there is evidence that the patient has had large doses of vaccine, as so commonly happens, one does best not to be too optimistic as regards the duration of the disease. These patients generally make a change in physicians because they are getting continuously worse. They have had their feeble immunity processes destroyed for long periods of time, and any improvement they show in weeks will be at the expense of much

gentle treatment and patience. Certainly no further vaccine experiments should be tried for a long time, and only then in true homeopathic doses.

Patients in whom urethral instruments have been used during the early stages of the infection usually present quite a therapeutic problem. The urethral mucosa has been so thoroughly traumatized that the infection is not only deep-seated but severe. They all have posterior urethritis, prostatitis, and possible infiltration of one or more urethral follicles. It is a mistake to go actively after these follicular infiltrations while they are acute. Under the gentle urethral treatments outlined, by far the greater number spontaneously subside and undergo gradual resolution. Their intraurethral surgical attack is by no means a simple procedure, and there is much reason to think that they do better if let alone. None but those showing a definite pointing toward the skin surface should be opened externally. The idea of passing instruments during the presence of the gonococcus in the discharge, in the hope of causing the more rapid resolution of these infiltrations, is faulty and at times disastrous.

The persistence of shreds in the voided urine long after the gonococcus has disappeared is usually a matter of the previous treatment. When from the anterior urethra they generally are caused by devitalized areas of mucosa. As a rule, the passage of a full-sized sound for the given urethra will clear them up rapidly. One should not fall into the error of thinking that, because the patient has had only an anterior urethritis, the shreds must of necessity originate in that portion of the canal. Probably at least 35 per cent. of all men have chronic follicular prostatitis that is or is not of venereal origin, and a large number of them have shreds in the urine. For this reason one does well to study the prostatic secretions of those individuals who, though they have had only an anterior urethritis, continue to exhibit shreds and a gonococcus-free morning discharge. Such an investigation at times will be

the means of preventing much useless urethral treatment, and will indicate treatment more appropriate to the case in hand.

Contrary to the views generally held, the writer's experiences have been such as to make him think rather lightly of the urethral follicles as a common source of shreds in the urine. At times they unquestionably do cause the persistence of shreds, but the times must be few and very far between. After the stage of active inflammation the lumina of these follicles open or they do not. If they open, they, with the amount of handling and pressure the urethra receives, should have rather good drainage, and gonorrhea is rarely perpetuated where drainage is good. If they do not open they sclerose, finally sterilize themselves, and cease to be a factor in the urethral condition.

One cannot but deplore the too common use in anterior urethral conditions of the urethroscope. It is an instrument requiring great skill for use without injury to the mucous membrane. They must have great courage who use it while the gonococcus is present. To use it intelligently in this portion of the canal requires more visual acuity than most men can acquire. The views obtained through the straight, open urethral endoscope might well be called the "dreamer's paradise." It is possible that some see through it what they think they see, but unquestionably most of those who use it must dream they see what really is not there. For topical applications to known anterior or posterior urethral lesions it is an invaluable instrument, but for purposes of diagnosis it has very decided limitations in most hands. The cure of gonorrhea generally can be accomplished better without its use.

It is admitted that possibly once in about several hundred times it might be good judgment to stir an extremely dormant gonococcal urethritis into activity by the passage of a full-sized sound. In the others it is unquestionably better to consider urethral instruments as belonging solely to postgonorrheal uses.

XXVI. TREATMENT CARRIED OUT BY THE PATIENT

As a general rule, the less treatment that is placed in the patient's hands the better the results will be. Much has been said to discourage this decidedly general custom, and a number of reasons have been given as to why it is a poor procedure. There, however, do occur combinations of circumstances that leave the physician no choice. Particularly is this the case with traveling men, and one has to decide whether it is best to refer them to physicians in different cities or to educate the patient to carry out his own treatment. To one who has referred patients to a number of physicians along a given line of travel, it is, unfortunately, evident that the latter plan is the better. Gonorrhea does better in one pair of moderately poor hands than when attacked by a multiplicity of doctors in as many different ways. There is so little uniformity of method, thought, and gentleness that such a disease fares badly when dependent upon it. In fact, no treatment at all is as good as a vast assortment of different kinds of treatment.

In placing the treatment of acute gonorrhea in the hands of the patient one should give very careful instructions to him. He should not only be cautioned emphatically against all kinds of trauma, but should be made to treat himself in the physician's presence to prove that he understands. He should be given a general outline of what he may expect from the disease and from his treatment.

The more simple the instructions, the better chance they have of being carried out by the patient, particularly if he is given a brief, written outline of them. It is best to underline the prohibitions regarding alcohol and sexual excitement. These cannot be stated too emphatically.

Some thought must be given to the staining possibilities of the substances advised for local treatment as suiting best the skill or awkwardness of the patient. Though one may feel that certain substances give the best results in his own hands, there are comparatively few patients who develop sufficient skill to use them without danger of exposing some rather personal secrets. The production of the proper amount of mucosal reaction is possible with so many substances that the matter of strength of solution is, perhaps, more important than just what substance is chosen.

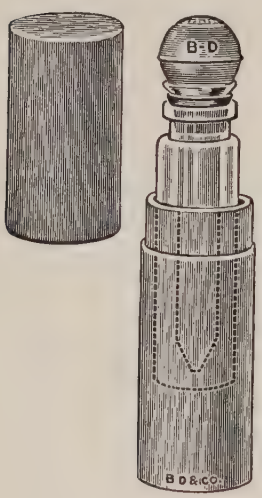


Fig. 52.—A convenient outfit for the patient's use.

The writer's experiences with the various silver salts have left him no doubt regarding the value of a preliminary cleansing of the urethra with 1:5000 potassium-permanganate solution. For this reason he would advise that the patient be given instructions to void urine and gently flush out the anterior urethra with the permanganate solution. After allowing this to drain out he should inject into the anterior urethra sufficient of the chosen silver salt solution to very gently balloon the canal and retain it for five minutes or longer. For the patient's own use $\frac{1}{4}$ of 1 per cent. of protargol, or 5 per cent. neosilvol are, perhaps, the best. They do not stain and generally produce the amount of mucosal response desired. .

The delicacy of the mucosa, and the ease with which its immunity efforts are checked, offer much argument against the number of such treatments generally advised in the twenty-four hours. Better results will follow one or two such treatments in that time than would accrue from a larger number. It is better for the patient to carry out one or two such treatments carefully than

six or eight with the amount of carelessness such frequent treatments engender. Midday treatments are rarely given under such ideal circumstances as are those carried out at bedtime and on rising.

With but little difficulty the patient can be taught to examine his first and second glasses of urine and discover the onset of posterior urethral infection if it occurs. To avoid undue alarm he can be told of the rôle of phosphates in rendering the urine cloudy, and be instructed to use dilute acetic acid to rule out such a source of cloudiness. He can be told of the subjective symptoms that usually accompany such a disease extension, and he should be instructed to discontinue all local treatments if this occurs. Thus fortified, a man of even moderate intelligence is not likely to harm himself greatly, and his disease should follow a shorter and milder course than if given a variety of treatments.

Should posterior involvement occur, he should be given instructions to make no great effort to retain large quantities of urine and to take no violent exercise if there is any quantity of urine in the bladder. Hot sitz-baths will do much to relieve his vesical discomfort, and he can be made further comfortable by small doses of paregoric. A knowledge that even under ideal circumstances he can expect several decidedly uncomfortable nights, after which the annoying symptoms will gradually subside, and that he should have no local treatments to the urethra for several weeks, will do much to ease his mind and fortify him against having ill-advised treatments carried out upon him by others.

Beyond this stage none of the treatment of the disease should be placed in the patient's hands. If under any circumstances he be allowed to carry out intravesical irrigations, the incidence of complications, particularly epididymitis, will be great. The removal of the residual infections in the smaller mucous channels is far beyond the possibilities of self-treatment.

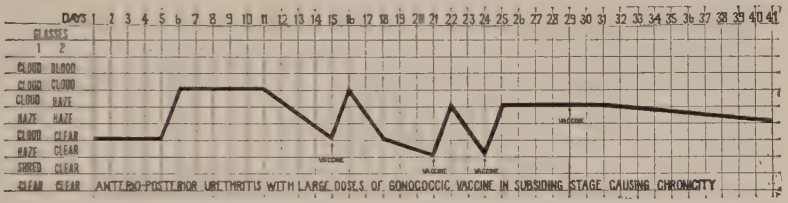
Too much care cannot be taken in instructing such patients

regarding the dangers of the disease to themselves and others, and too much stress cannot be laid upon the necessity for gentleness in its treatment. At best, such self-treatment is only preferable to the differing methods of a variety of doctors. It is a thing to be avoided whenever possible.

XXVII. THE USE OF GONOCOCCAL VACCINES

THE dangers of large doses of gonococcic vaccines have been alluded to upon several occasions. So delicate is the immunity balance in this disease that the administration of large quantities of vaccine usually has an opposite effect from that desired. The absorption of too little antigen makes for a tardiness in the development of the body's immunity responses, and overwhelming amounts often obliterate them. This is brought out rather well by the differing behaviors of the urethral infection as the results of epididymitis and massive joint involvement. After the former the urethral condition generally clears up rather rapidly, whereas

CHART X

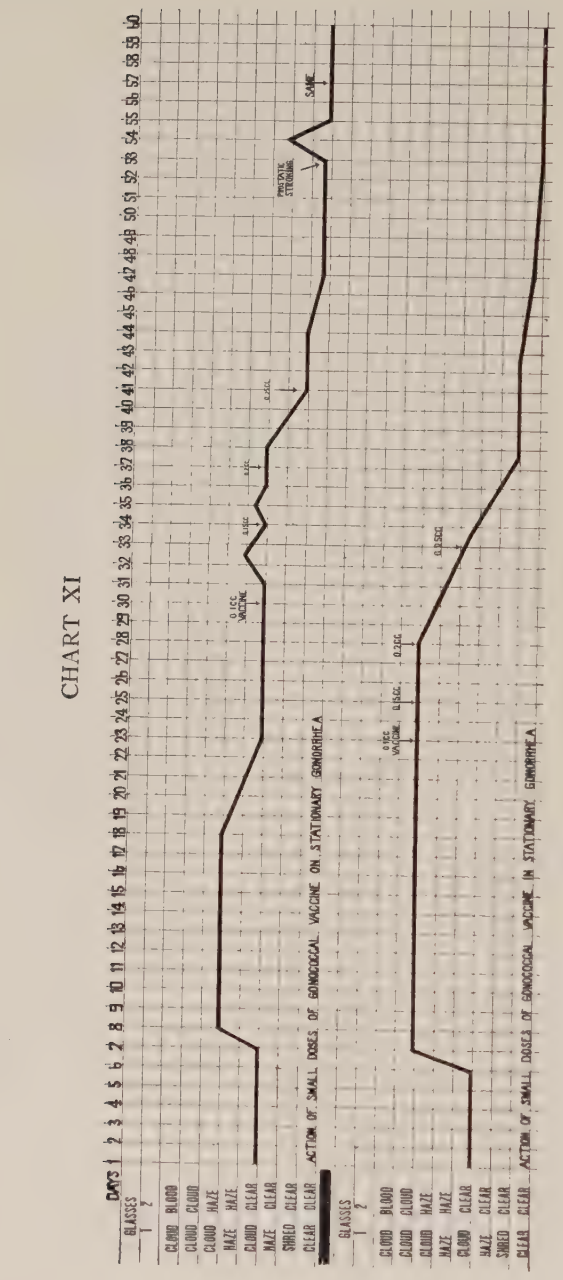

DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41
GLASSES
1 2
CLOUD CLOUD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
VACCINE
VACCINE
VACCINE
VACCINE
ANTERIO-POSTERIOR URETHRITIS WITH LARGE DOSES OF GONOCOCCIC VACCINE IN SUBSIDING STAGE CAUSING CHRONICITY

the enormous amounts of gonococcal toxins finding their way into the system from massive arthritides have entirely the reverse effect.

Clinically, it is common to encounter patients who have been given many large doses of vaccine during the acute stages of urethritis. When seen they usually have a moderately profuse urethral discharge, which continues for a long time, no matter what treatment is used. All of them have had a posterior urethral involvement, and in most both glasses of urine are cloudy and continue so for weeks. Their improvement is very gradual and decidedly delayed, as will be seen in Chart X.

There is no doubt regarding the value of gonococcal vaccines when used in proper doses at proper times. Used otherwise they

CHART XI


DAYS 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60
GLASSES 1 2
CLOUD BLOOD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
ACTION OF SMALL DOSES OF GONOCOCCAL VACCINE ON STATIONARY GONORRHŒA
0.1 CC VACCINE
0.05CC
0.025CC
PREFATIN STEROIDAL
SAME
GLASSES 1 2
CLOUD BLOOD
CLOUD CLOUD
CLOUD HAZE
HAZE HAZE
CLOUD CLEAR
HAZE CLEAR
SHRED CLEAR
CLEAR CLEAR
0 CC VACCINE
0.15CC
0.25CC
0.35CC
ACTION OF SMALL DOSES OF GONOCOCCAL VACCINE IN STATIONARY GONORRHŒA

are a distinct detriment. For a number of years the writer has made use of small doses of vaccines in those cases that continue in a stationary stage for some time, as well as at the first sign of joint pain or definite arthritis, with the happiest results. The procedure has been to give as an initial dose 0.15 c.c. of stock gonococcic vaccine.[1] Two days thereafter 0.2 c.c., and three days later 0.25 c.c. are injected. Four days later a dose of 0.3 c.c. is given. No more than four doses are injected and no greater quantity than 0.3 c.c. is ever used.

Given thus to patients who have failed to improve beyond a fixed point, in over 75 per cent. of cases vaccine will supply the required immunity stimulant that will cause great improvement. Such a result will be seen in the cases on Chart XI. If it is used in this manner at the very earliest signs of joint involvement, very few cases will fail to respond quickly, and massive arthritis will be a rare event.

The failures of gonococcic vaccines have been due to the enormous doses used. Such doses are a definite menace. They reduce tissue resistance to the ravages of the gonococcus, favor the graver complications, and induce chronicity.

[1] These amounts are based upon the standard vaccine dilutions of 1,000,000,000 gonococci to the cubic centimeter.

XXVIII. THE CAUSES AND PREVENTION OF CHRONIC GONORRHEA

In a consideration of chronic gonorrhea one must make some very close distinctions, for it has become the custom to include under this classification things that are not really gonorrhea. Many of the conditions that have lingered after the disappearance of the gonococcus have been thus considered. Some of these were due to infections by secondary bacteria upon a soil previously prepared by the gonococcus, and some have had no relation to an antecedent gonorrhea. Further, the term "chronic" has been given to many subacute and latent gonorrheas that were not in any sense chronic.

By making a generous allowance for what differences there may be in personal resistance or in gonococcal virulence, it is safe to say that, in the male, the gonococcus should have disappeared from the urethra and its adnexa well within six months of the acquisition of the disease. For this reason let us consider as chronic those cases in which the gonococcus persists for six months or longer.

Regarding the causes of such lengthy stays of the gonococcus in the male urogenital tract there is great difference of opinion. Much has been said in the past about the lack of personal resistance as a determining factor. The more closely one studies this phase of the question, the less he will think of it as a cause of chronicity. In fact, the reactive powers of almost all individuals are so good that, in the absence of massive gonorrheal arthritis or the use of large doses of gonococcal vaccines, it is probable that lack of resistance is not the answer to the cause of chronicity in more than one in two hundred cases. It is certainly a slender thread whereon to hang an excuse for failure to cure.

Unquestionably with careful, gentle treatment, and proper cooperation upon the part of the patient chronic gonorrhea in the male can almost entirely be obliterated as a clinical entity. It probably has less excuse for being than any common disease, for few are more easily preventable. That it is frequent, and is generally preventable, makes the subject well worthy of close scrutiny, for these are the cases whereby the disease so commonly is transmitted to others.

The study of the causes of chronicity is an extremely fertile field wherein can be acquired that knowledge that often comes only after years of professional life as to *what not to do*. If one will take the time to inquire of a number of patients with chronic gonorrhea found in any free dispensary just what was done to them, and what they did during the first two months of their disease, he will find much food for thought. The uniformity of their answers is so striking that it quickly gives the key to the most common causes of chronicity.

By making the most generous allowances for the influences of the patient's own acts there will be found a composite picture that cries aloud for correction. For many of the forms of treatment in general use today are not so potent for cure as they are for the production of conditions that lead to chronicity.

The most common things that will be brought out by such inquiries can be briefly enumerated as follows:

1. The passage of instruments or solid bodies into the acutely inflamed urethra.

2. The use of injections and irrigations under very high pressure.

3. The use of substances in the urethra that caused great burning, and a profound subsequent inflammatory reaction.

4. The administration of large doses of vaccines in early stages of the disease.

5. The entrusting of all of the treatment to the patient without adequate instructions.

6. The use of intravesical irrigations when only the anterior urethra was infected.

7. The use of silver nitrate instillations into the posterior urethra during the early stages of its acute inflammation.

8. The use of astringent injections, whereby the disease was rendered latent from the start.

9. Pronouncing the patient safe to indulge in coitus without doing more than looking at his urine to determine cure.

10. The use of prostatic massage so early it could only do damage to the gland.

11. Such strenuous prostatic massage that it caused the patient great pain.

12. Prostatic massage under such conditions, and of such a type, as to favor extension to the seminal vesicles and epididymes.

13. Strenuous local treatments during an acute posterior urethritis.

14. Lack of knowledge that the prostate becomes infected in every case of posterior urethritis and does not recover spontaneously.

15. The use of too many forms of treatment rather than the adequate use of one.

16. Failure properly to acquaint the patient with the dangers of the disease and the necessity for a strict mode of life.

If, for comparison, the inquiry is extended to the patients who experienced moderately short attacks of gonorrhea, and who present no gross postgonorrheal lesion, the story will be very different. In this group of cases one soon will be struck with the fact that almost none of them were the victims of too-meddlesome treatment. It will be found that they were well instructed as to the things they should not do, and conscientiously followed these instructions. If they used hand injections, they did it with real gentleness, and the reactions immediately following their use were so slight as to prove that the solutions were not so strong as to be highly irritating. If the physician carried out local treatments,

they were not of a type that caused great pain, and no instruments were passed into the urethra, or, if they were, it was not done until very late in the course of the disease and it was very gently done.

Among these cases a few will give a history suggesting only anterior urethritis, but by far the greater number will give a clear-cut history of involvement of the posterior urethra also. Of these latter, at least 75 per cent. will have a chronic follicular prostatitis, kept up by secondary invading germs on a soil previously prepared by the gonococcus. The 25 per cent. who do not have prostatitis will give a history of having had moderately gentle prostatic massage over a period of three months, or longer, after their gonorrhea apparently had subsided. Not over 2 or 5 per cent. will have had epididymitis, whereas the first-mentioned ones, who have had the "too-meddlesome" treatment, will show an incidence of this complication ranging well up toward 25 per cent.

It would be satisfying if the differences in these groups could be blamed upon the varying degrees of resistance offered by the patient's own tissues. An explanation so consoling to the physician does not accord in any way with the writer's experiences in this disease, for he has found only a small number of patients who did not quickly develop the tissue response which we call "resistance." Of this number at least 75 per cent. were decided blonds, and most of the others were weak as to hygiene, and even these, properly treated and controlled, usually can be made to develop this resistance so that they will be free of gonococci well within six months.

Such a comparative study of these two greater groups of cases, those cured reasonably quickly and those of long duration, with the most generous allowances for the patient's own faults of conduct or treatment, is sure to engender the conviction that there is something radically wrong with the treatment of the day. Nor is it hard to find what that something is. Moreover, a careful

scrutiny of some of the text-books upon the treatment of gonorrhea readily reveals the reasons for so deplorable a situation.

As chronic gonorrhea is really a disease of the smaller mucous channels in association with the urethra, and as these smaller structures obviously retain their infection because of their definitely poor drainage, and not because of any difference in their mucosa, it is clear that no form of treatment that can in any way obstruct their outlets is good treatment. Without question the passage of any solid body, whether it be a sound, instillating syringe, or soft catheter, over this delicate mucosa struggling for existence against this disease causes trauma, and such practices do more harm than good. It is after such practices that many of the saddest sequelæ are seen.

Upon this aspect of the subject it would be easy to write many chapters, but for brevity a number of "don'ts" will serve the present purpose. Careful study brings out many "don'ts" that are of great importance if thoroughly preventable complications are to be checked. Let us, then, set down the most important.

1. Don't do anything to devitalize this very delicate mucosa, which must be relied on for cure.

2. Don't injure it by the passage of solid bodies over it until there is reason to feel the gonococcus is gone.

3. Don't use chemicals that cause a greater reaction than the membrane can stand.

4. Don't trust too much treatment to the patient, for he has usually less skill than the most unskilful physicians.

5. Don't inject substances into the posterior urethra when only the anterior is infected.

6. Don't use a hydrostatic, or any other, pressure of more than 3 feet of water. The inflamed urethra cannot stand it without injury.

7. Don't give large doses of gonococcal vaccine in acute or any other gonococcal infection of the urogenital tract.

8. Don't carry out local treatments to the anterior urethra when the posterior urethra is acutely inflamed, for their possibilities for harm outweigh the slight good they may do.

9. Don't think the bladder cannot be filled with 3 feet of water-pressure, for it is generally easier to get the cut-off muscle to relax with slight than with great pressure. The latter irritates it and throws it into spasm.

10. Don't forget that posterior urethritis means prostatitis, and that too-early prostatic massage means permanent damage to the gland and possibly abscess formation.

11. Don't forget that unskilful prostatic massage, heavy lifting, and sexual excitement or indulgence with a full bladder, are the most common determining factors in epididymal involvement.

12. Don't fail to gain the patient's co-operation. Lack of it will render practically useless the most careful treatment.

13. Don't think a clear urine means cure, for the gonococcus has a strong disposition to colonize and lie dormant. It can be stirred to activity by any type of roughness, and it is better that it be stirred by the physician than the infection persist unperceived and perhaps be transmitted.

14. Don't forget that the utmost gentleness and judgment in the treatment of acute gonorrhea will obliterate chronic gonorrhea, and that the best ally is an untraumatized mucous membrane with good drainage.

XXIX. THE TREATMENT OF CHRONIC GONORRHEA

The treatment of chronic gonorrhea resolves itself into its prevention and the eradication of the deeper-lying foci of infection. If we remove these feeding foci, the free urethral mucosa almost always will rid itself of the gonococcus. It is of little, if any, use to treat the well-drained mucosa unless we search for and cure the feeding areas in the smaller mucous channels. Chronicity, in the absence of large doses of vaccines or faulty personal conduct, means poor drainage, and if we promote drainage we promote cure.

In approaching the cure of such long-standing infections, it is well to inquire carefully into the conduct of the patient and bend every effort toward its correction. As in acute gonorrhea, the avoidance of sexual excitement and alcohol is of paramount importance, so in chronic infections cure cannot be obtained without the avoidance of both of these disturbing factors. If the patient can be made so to deport himself as not to interfere with cure the treatment of chronic infections, as a rule, is not a difficult matter. It is perhaps tedious, but generally within the skill of every physician. It requires patience, gentleness, and judgment. The more difficult intra-urethral procedures are rarely required.

Mention has been made of the influences of large doses of gonococcal vaccines, and massive joint infections upon the course of gonorrhea. These cases, in so far as the local attack of the infection is concerned, present a problem that differs little, if any, from other chronic cases. Obviously, in them, extreme care should be taken as to any experiments with gonococcal vaccines. Such patients are already suffering from a marked retardation of immunity processes from overwhelming amounts of gonococcal toxins.

In the other cases, very small doses of vaccine given as previously advised often will cause that antibody urge that is needed for cure.

As the upper urinary tract and the bladder are practically never factors in the persistence of gonorrhea, we have but to consider locally those mucous channels emptying into the urethra distal to the vesical sphincter. This limits us to such structures as the prostatic follicles, utricle, seminal vesicles, Cowper's glands, the smaller urethral follicles, and such other factors as might interfere with urethral drainage, such as strictures or a small external meatus.

It was pointed out, regarding the smaller urethral crypts, that they did one of three things when infected by the gonococcus. If permanently occluded, they eventually sterilized themselves, formed small, round nodules of sclerosis, and ceased to be factors in the disease. If they were not occluded, their drainage possibilities were generally sufficient for them to free themselves of the infection. If they were intermittently occluded, they could hold infection for long periods. Clinically, it is evident that this intermittent occlusion is such an uncommon event that it is seldom a factor in chronicity. Owing to the difficulty of treating the smaller urethral crypts locally, due to their minute caliber, this is a most fortunate circumstance.

It is, consequently, a fact that in over 98 per cent. of the cases of chronic gonorrhea we have to consider only the other structures mentioned. There is further good fortune in the fact that at least 90 per cent. of all cases of chronic gonorrhea are due to prolonged gonococcal colonization in the prostate gland, for of all of the causes underlying chronicity this is the most easily treated, and the most surely curable.

The writer feels that the high percentage of seminal vesicle infections by the gonococcus reported by some writers is much in error. He has seen little clinical and pathological evidence to substantiate their claims, and finds many reasons to believe that

true gonorrheal seminal vesiculitis, even in cases with epididymitis, does not occur in more than 2 per cent. of the patients. This view is further discussed under its appropriate heading. It should be

Fig. 53.—Cross-section of the prostate gland, giving an excellent idea of the complexity of this structure. It is really remarkable, considering the endless number of small mucous spaces in the gland and the minute tubes through which they empty their contents, that sufficient drainage could be established by massage to cause recovery from infection. The reasons for the length of time necessary for such cures are obvious. At A we see the verumontanum with the arched space of the posterior urethra surmounting it. At B are the cross-cut ejaculatory ducts. (Courtesy of Dr. Henry H. Morton.)

thought of, however, and every effort made to prove that it does not exist.

Chronic infection of Cowper's glands does occasionally occur, and if present it will act as a feeding focus, favoring chronicity.

A very small urinary meatus is so easy of diagnosis that its rôle in the causation of chronic gonorrhea hardly calls for mention.

Stricture of the urethra is not so common as it used to be. As a cause of chronicity it is, at times, a troublesome condition. However much one dislikes to pass instruments into a gonorrheal urethra, a tight stricture at times leaves little choice, for such a gonorrhea often will not clear up until the urethral coarctation has been fully dilated. An effort, however, should be made to clear up the infection before resorting to dilatation of the strictured area. Failing in this, the urethra should be carefully irrigated and gradual dilatation commenced. High intra-urethral pressures from irrigating fluids should be avoided, particularly after instrumentation, as they may cause deep urethral infections requiring free surgical drainage.

As most of the treatment of chronic gonorrhea depends upon the removal of infection from structures that are elsewhere discussed, there is no need for repetition here. Suffice it to say, that no case of chronic gonorrhea should be discharged as cured until it has had a final course of full dilatations with either a Kollmann dilator or sounds.

With gentle, judicious, and persistent treatment there is no need for the present degree of pessimism regarding the cure of these conditions. Cure cannot be accomplished quickly, but it can be accomplished surely in practically every case. It generally requires months of adherence to the plan of treatment appropriate to the given case. Constant changes of treatment seldom accomplish the end sought.

In starting to treat chronic gonorrheal urethritis due to infections in any of the associated mucous channels it is always well to carry out a series of intravesical irrigations under low hydrostatic pressure before too actively attacking the feeding focus. This is particularly wise in those cases showing any degree of activity, for it produces a degree of local tolerance rendering other

treatments moderately safe. If, however, the urethral discharge is very scanty, and the condition decidedly sluggish, little risk is incurred beyond that of an increased discharge by directly treating the deeper foci of infection.

There is no great advantage in giving too much thought to the urethra itself during the treatment of these foci, for it will not recover permanently while they exist. On the other hand, it almost always will clear up of its own accord as the causal foci improve.

XXX. THE TECHNIC OF PROSTATIC MASSAGE

The discomfort of, and the possibilities for harm involved in improper methods of prostatic massage, make the consideration of the subject highly important. The older methods of carrying out this simple form of treatment were not planned with due regard to the anatomical structures and physiology of the parts, nor did they take into consideration the comfort of the patient. They were likely to be the direct cause of complications of considerable gravity, and to make the treatment a thing to be dreaded and evaded by the patient.

Considering the question from an anatomical standpoint, it is evident that any form of massage that brings direct pressure upon the posterior urethra at each stroke is faulty. The posterior urethra traverses the midline of the prostate, and at each extremity of it is a sphincter muscle. The sphincter at the vesical outlet is much the weaker, and each time direct pressure is made over the urethral line, any secretion forced into the urethra from the prostate will be forced in the direction of least resistance or back into the bladder. From the number of cases of epididymitis following this form of massage, it is evident that the secretion at times is forced into the ejaculatory duct, seminal vesicle, and epididymis. Such being the case, it is obviously safer to perform prostatic strokings so that any expressed fluids are carried in their natural directions rather than forced back into the associated mucous structures. Fortunately, massage thus carried out is a far more comfortable procedure for the patient. Direct pressure along the urethral line is the most painful part of prostatic manipulation, and any form of massage that causes such pressure at each stroke is needlessly painful.

If we view the prostate from its rectal surface, we will observe that on its upper border there is usually a notch lying between the upper poles of the lateral lobes. Extending beyond these lobes are the seminal vesicles, whose ducts converge toward the mid-, or urethral, line, to empty into the urethra. Between the seminal vesicles are the dilated extremities of the vasa deferentia, the ampullæ.

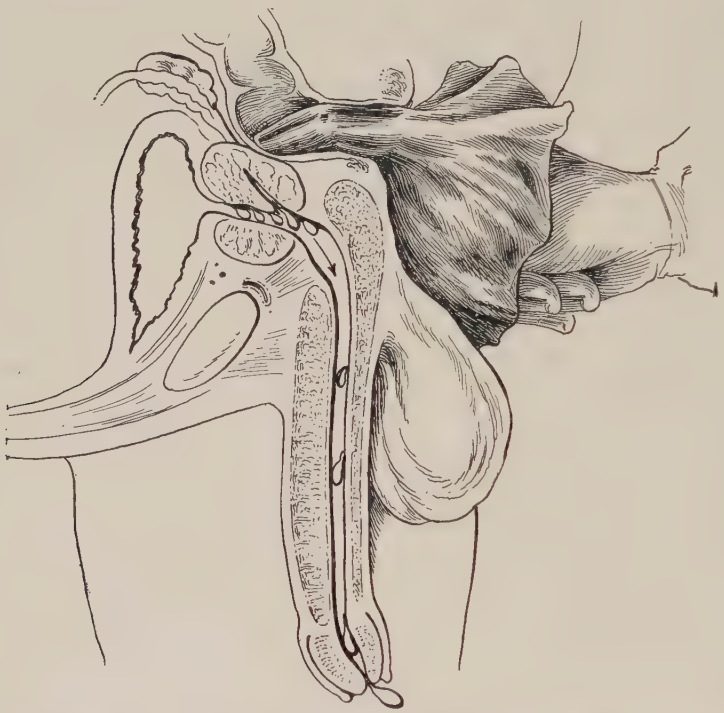


Fig. 54.—Method of obtaining the prostatic fluid for microscopic study. Note the single glove finger, with the cape for the protection of the hand.

A study of the natural direction of flow of these mucous structures will, in itself, suggest that cross massage is an error. Equally erroneous is that form of massage in which the finger is brought in a curved direction downward and inward to the urethral line.

Considering all things, and not least the comfort of the patient, it is easily seen that massage, carried out in such a manner as to

force the fluids in their normal direction and to bring about a minimum of urethral stroking, is both safest and most comfortable. This is easily done by passing the finger well up over the upper pole of a lateral lobe and bringing it down in a direction parallel to the midline. By carrying the tip of the finger so that it presses slightly away from rather than toward the urethra, the lateral lobe can be well emptied by three or four such strokes.

After both lateral lobes have been emptied in this manner, the finger is passed well up beyond the median sulcus of the prostate, and brought several times from there to the anterior extremity of the gland. By this procedure any expressed pus that may have entered the ejaculatory duct openings is stripped from them into the posterior urethra, and from thence past the cut-off muscle into the bulbar portion of the anterior urethra, from whence it is readily obtained for microscopic study.

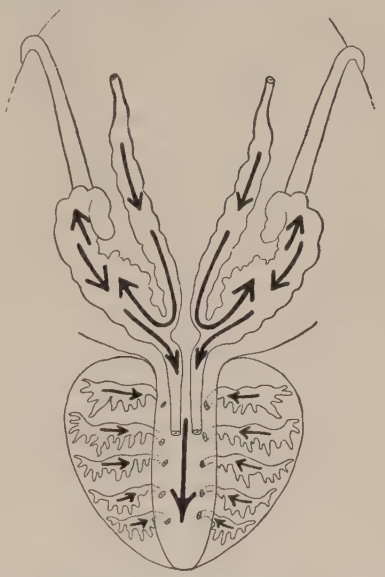


Fig. 55.—Diagrammatic outline of the prostate gland, seminal vesicles, and ampullæ to illustrate the normal directions of their fluids.

The advantages of this form of prostatic massage are several. The dangers of such complications as seminal vesiculitis and epididymitis are greatly reduced. The expressed secretions are not forced back into the bladder, but into the anterior urethra, reducing the number of so-called "dry-taps" in obtaining them for study. The discomfort to the patient is reduced to a minimum, and what discomfort he feels is at the end of the process.

Aside from the proper directions in which one should carry the finger-tip, there looms the important question of just how much

pressure should be applied to the structures. In this, with certain reservations, the patient's discomfort is perhaps the best guide. Massage that occasions great pain is too strenuous. In judging the amount of pain one, however, must discount the apparent evidences of pain that are merely an expression of the patient's apprehension, for it is the custom of some to make a great cry for fear they will be hurt. There is, however, a marked differ-

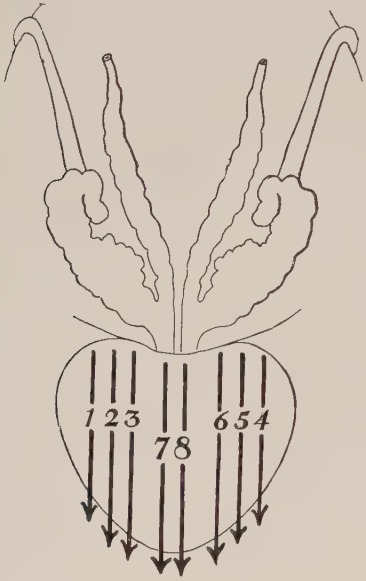


Fig. 56.—Direction of the stroking of the prostate gland. By leaving the midline strokes until last the discomfort is reduced to a minimum and is at the end of the treatment.

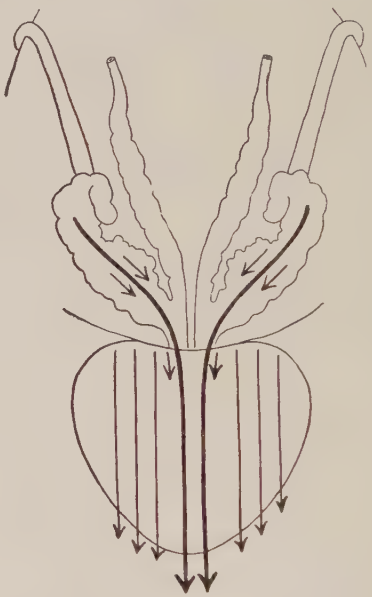


Fig. 57.—Prostatic massage and stripping of the seminal vesicles.

ence in the tolerance to prostatic massage exhibited by different patients. Likewise, an amount of pressure causing great pain upon the first massage will be easily borne after several treatments, as the gland becomes more and more tolerant. It is, therefore, wise to start with the gentlest stroking, and gradually increase the pressure at later treatments as the prostatic tolerance increases.

XXXI. THE STUDY OF PROSTATIC SECRETION

It is not possible to say that the prostate gland is free from infection by rectal palpation alone. Such a study may, at times, determine the greater degrees of prostatic pathology, but nothing short of a microscopic study of the glandular secretion can prove that there is no infection. Despite this obvious fact, many patients are pronounced free from disease without resorting to the microscope. The gland can be, and commonly is reeking with infection, when it is normal to palpation and the urine is macroscopically crystalline. To these hidden infections can be attributed most of the infections of women.

There is a decided impression in the minds of many physicians that prostatitis is essentially a postgonorrheal condition and does not exist if there has been no antecedent gonorrhea. Nothing could be more erroneous than this. It is true that the greater number are postgonorrheal in the sense that the gonococcus, once having been present, has died out, and the inflammatory condition has been continued by secondary bacterial invaders upon a previously prepared mucosa. It also must be remembered that, while true gonorrheal prostatitis in the vast majority of cases seems to be a self-limited disease, there are those patients in whom the gonococcus remains in the absence of proper treatment for months. On the other hand, the association of prostatitis, with more distant foci of infection in the tonsils, teeth, sinuses, or gall-bladder, and in the absence of a previous gonococcal infection, is far too common to be mere coincidence.

The recognition of such infections does not of necessity belong alone to the specialist, and the technic of their study could be quickly acquired by anyone having a fair knowledge of mi-

croscopy. While the more complete study of the prostate and its secretion consumes considerable time, the most important question, the presence of pus, can be answered in a very few minutes. The usual procedure is to place some of the fresh fluid upon a microscopic slide and overlay it with a cover-glass for study. The fresh secretion of the normal prostate shows from two to six leukocytes to the 1/6-inch field, that of the abnormal exhibits

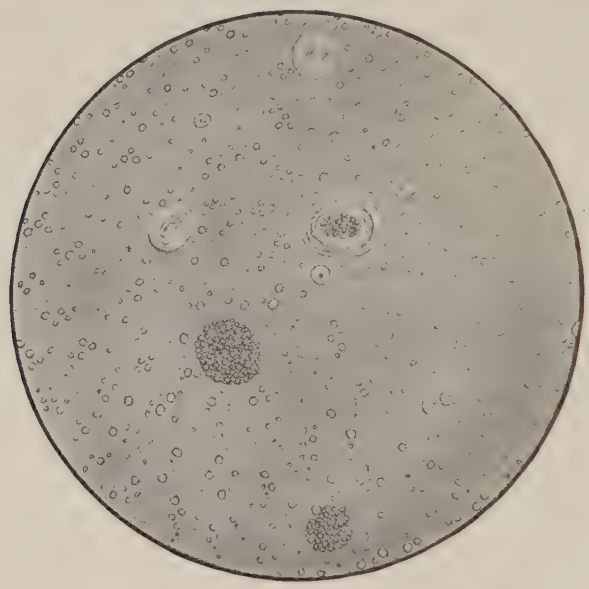


Fig. 58.—The microscopic appearance of normal prostatic secretion. The laminated bodies are corpora amylacæ. The other large cells are prostatic granule cells. The next smaller are polymorphonuclear leukocytes in normal numbers. The remainder of the field is studded with lecithin bodies which are characteristic of this secretion.

almost any number above this, with a corresponding diminution of normal elements.

The one constant and characteristic feature of all prostatic secretions is the presence of the so-called lecithin bodies or granules. Under the 1/6-inch objective these are small, round, refractile bodies, ranging in size from the minutest point almost to the diameter of the red blood-cell. They vary in numbers in different

secretions, and are greatly decreased in the presence of large numbers of pus cells. As the pus cells decrease in quantity the lecithin bodies increase. So constant is this change that it has been used as a rough estimate of the number of pus cells present; so that one might say that a given secretion contained 10, 20, or more per cent. of pus cells, as the ratio between the two seemed to him without actual count.

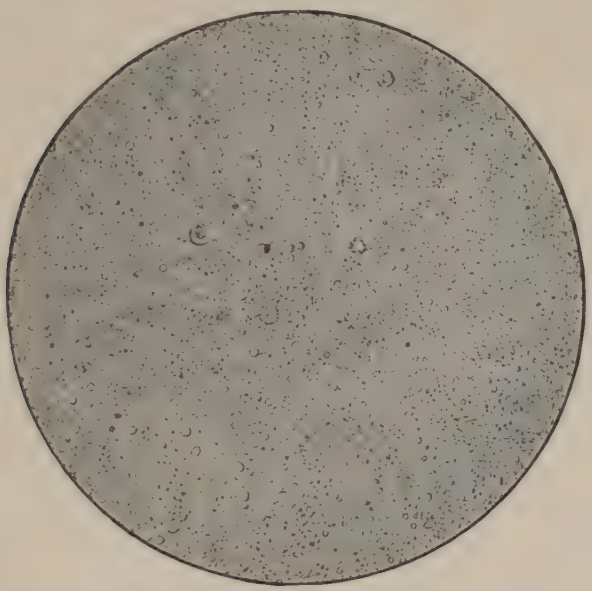


Fig. 59.—Prostatic secretion composed almost entirely of granular débris. A restudy within a few days generally reveals a large amount of pus.

In judging of the condition of a prostate from a secretion that seems to contain countless, closely packed lecithin bodies, and no pus cells, it is well to exercise caution, for there is a common confusing factor in this regard. Whenever such a secretion is encountered it is best to make a second examination within the next few days to avoid error. The chronically infected, non-draining prostate has its ducts filled with quantities of granular débris, the product of disintegrated purulent material. This is

forced out at the first massage and cannot be differentiated microscopically from true lecithin bodies. There may be no pus cells liberated, but a subsequent massage expresses large numbers of them. Such a condition is by no means rare and should always be borne in mind, particularly where the prostate is being studied as a possible focus of infection for distant symptoms.

It also should be remembered that in some individuals the entire gland may not be infected, and that a perfectly normal secre-

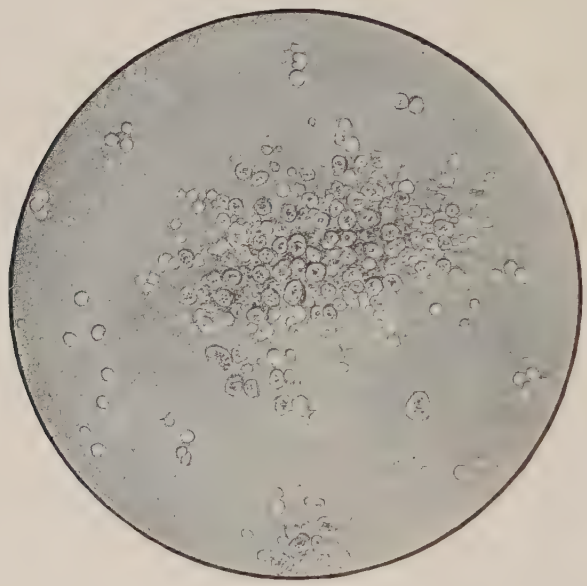


Fig. 60.—Prostatic secretion of a poorly draining infected gland. The scarcity of lecithin bodies in such secretions is very striking. As the leukocytes decrease in number these increase.

tion may be obtained on the first few studies, because a deeper focus of suppuration was not emptied into the urethra.

The presence of more than six pus cells to the 1/6-inch field means prostatic infection. Free pus bespeaks fair drainage, and clumped pus cells poor drainage. Improved drainage during the course of treatment is shown by the reduction in number and size of these clumps and their final disappearance.

The presence of red blood-cells in the expressed prostatic secretion is usually an evidence of urethral congestion or roughness in obtaining the secretion. It may, however, be due to other pathology, such as urethral papilloma or ulceration. If due to congestion it generally disappears after the first few massages, but, while it is present, one does best not to massage over the urethral line.

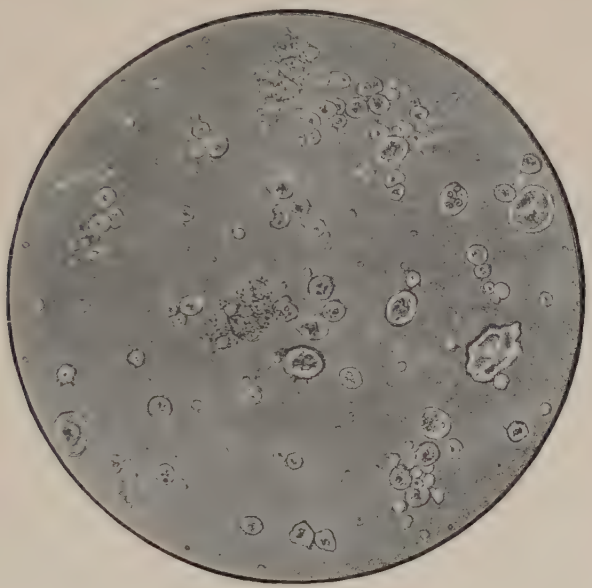


Fig. 61.—A prostatic secretion showing a slight tendency toward clumping of the leukocytes. Such a secretion is commonly seen and bespeaks poor prostatic drainage. It likewise is an intermediate picture evidencing improved drainage where previously there has been large clumps.

The search of stained prostatic secretions for bacteria is not always so satisfactory as would be supposed. Not only are these secretions difficult to fix to the slide, but they rarely give a picture with very clear definition when stained. The entire field takes the stain to a varying degree, and there are many round bodies of varying sizes that are difficult to differentiate from the various cocci. As a rule the leukocytes stain poorly, and it is

rare that one feels perfectly satisfied with his study of the bacterial content of prostatic or seminal fluids by this method.

A far better method is to collect the prostatic secretion in sterile distilled water, shake it well, and throw down the bacterial and cellular content by the centrifuge. This sediment sticks well to the slide, and gives an entirely satisfactory microscopic picture which makes for accuracy in diagnosis.

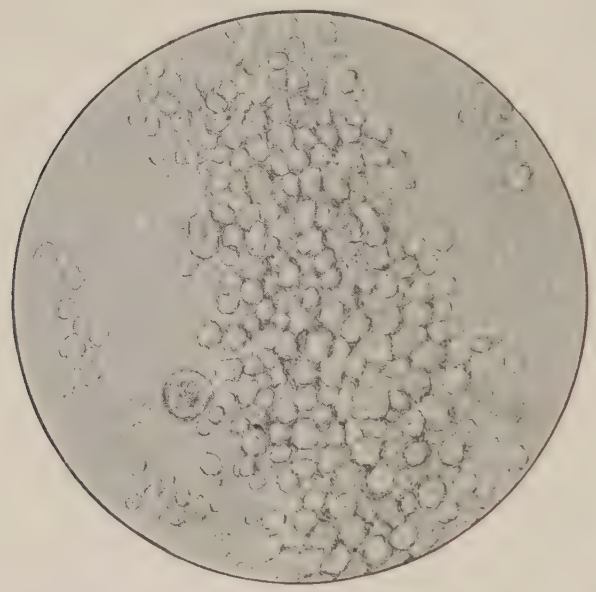


Fig. 62.—Prostatic secretion from a badly infected non-draining gland. The leukocytes are closely packed, old, and on the verge of disintegration. Lecithin bodies are almost absent.

The culture of prostatic secretions is usually a simple matter if certain precautions are carried out, but at best there are factors of possible error. The anterior urethra always contains bacteria, which should be washed out by urination immediately before massage is carried out for culture purposes. Obviously, one cannot be sure that all of the surface bacteria are thus removed. On the other hand, if one tries to irrigate the anterior urethra prior to massage, it matters not what his technic, he is almost sure to get

in his culture air-borne, spore-forming contaminants that make plating methods both necessary and difficult. Such are rarely present when the urethra is "cleansed" by urination only, and the number of negative cultures one can get from normal prostatic secretions by this means will cause him to view lightly the true urethral contaminants.

XXXII. DANGER ZONES IN PROSTATIC MASSAGE

Owing to the ease with which the diagnosis of prostatitis can be established, there has been, and still is, a good deal of rather indiscriminate prostatic treatment. Too little care has been taken in determining whether such treatments promised benefit or would be productive of harm to the patient. Discontinuing the local attack upon the gland when trouble had eventuated, instead of foreseeing such a possibility, has been instrumental in discrediting this extremely valuable procedure in many quarters and has been productive of complications of much gravity in not a few patients.

It never should be forgotten that prostatic massage is applied for the cure of disease; that the tissue directly attacked is the seat of disease; that no such lesion in the body is best cured by roughness, and that this organ offers no exception. Our aim is threefold, and is only reached by gentleness. We desire to promote drainage in a poorly draining organ, to improve its circulation, and to stimulate its musculature. Bruising cannot accomplish any of these and may do great injury.

The dividing line between the prostates that are benefited and those that are harmed by any kind of manipulative treatment is not always easy to determine. It is, however, of the greatest importance that they be differentiated from one another. The recognition of those that should not be massaged often taxes one's clinical judgment to its utmost; doubts often arise, and when they do a good rule to follow is do not massage.

There are certain groups in which doubts should not arise and in which judgment should dictate the safest course. On the other hand, certain borderline groups are apt to mislead, for which reason an effort will be made to discuss them briefly.

The Acutely Inflamed Prostate.—It seems hardly necessary to sound a note of warning against digitally disturbing such an organ, but it does not always escape attack. Such prostates are usually hot, swollen, throbbing, and decidedly tender. Their massage is a blunder that may cause abscess formation by breaking down the barriers to infection that nature is trying to form. Also, it is conceivable that even greater damage could be done by causing a systemic invasion by the infecting organism.

The Tender Prostate.—Proper massage of the chronically inflamed prostate is uncomfortable, but it is not acutely painful. The general rule can be made that the very tender prostate, if massaged at all, should be massaged with the utmost gentleness and care. It is a borderline gland which should arouse suspicion.

Under this heading might be included a type of infected prostate, the diagnosis of which can be obtained only from the history, as it may be perfectly normal to palpation. The history of these patients is that suddenly, either with or without vesical discomfort, there appears a cloudy urine, at times followed by an urethral discharge. The condition is apparently due to the rupture of small submucous pus pockets, though there is seldom any acute pain. These patients commonly give no history of previous venereal disease, and are usually free from gonococci. The seizures last several days and then subside. Recurrences are common. Palpation of these prostates shows nothing diagnostic, though there is often great tenderness if gentle pressure is made upon the midline in the region of the vesical outlet. While these prostates are loaded with pus massage should be withheld until the tenderness is no longer present, and discontinued if it causes prolonged discomfort.

The Calculous Prostate.—The presence of calculi in the prostate is usually discovered by the transmission of a clicking or crepitating sensation to the finger. Calculi of varying sizes may,

however, be present in the gland and not be discovered. This probably accounts for a small number of the prostates that are not improved by any form of treatment. Stones of any considerable size will generally cast an *x*-ray shadow. Massage of these glands does no harm, as a rule, but it rarely does any good except where there are distinct symptoms of toxic absorption from the prostatic acini.

The Nodular Prostate.—Nodules of any kind in the prostatic substance should be viewed with great suspicion, and massage withheld until they are proved not to be tuberculous or malignant. Theoretically, interstitial inflammation of the prostate can cause marked nodulation of the gland, and, from an academic viewpoint, such must be admitted to be the case, but from a practical, clinical view this possibility had best be forgotten.

It is not enough to consider that only hard nodules are tuberculous or malignant. The acute tuberculous focus is not hard, and in the markedly nodulated tuberculous prostate soft swellings may occur. Massage of the tuberculous prostate usually is followed by marked activity in distant organs, if not by a generalized miliary tuberculosis and death. Also, massage is poor treatment for malignancy. The proportion of such prostates that are subjected to massage is far greater than it should be.

The Non-responding Prostate.—Under this heading may be grouped that considerable number of patients in whom there seems to be clinically no contraindication to massage, but who either grow worse or do not improve during the time it is carried out. It safely can be said that if the local symptoms of these patients are not improved or banished after six weeks of treatment, a pathological condition exists other than follicular prostatitis. By this it is not to be inferred that one can render such glands free from pus in that time, but that there should be a subsidence of the subjective and an improvement in the objective symptoms. These patients should be given a careful cysto-urethro-

scopic study. In most of these prostatic urethræ will be found the lymphocystic bodies that the writer has described as an evidence of systemic tuberculosis, and which are discussed in a later chapter.

In some of these non-responding cases many very large prostatic openings are seen in the posterior urethra. Some of these are openings to old, played-out abscess cavities, whose walls are so rigid they cannot collapse. These patients may be benefited by the occasional drainage afforded by massage, but they cannot be cured by the procedure. McCarthy has attributed the large, scarred prostatic openings to a played-out tuberculosis. In such cases massage is decidedly contraindicated by the possibility of reactivating dormant tuberculous foci. As a matter of fact, it would really be wise to precede massage in all *chronic* prostatic conditions by a cysto-urethroscopic study and thus avoid such unfortunate experiences.

Prostatitis in Tuberculous Patients.—Landis has repeatedly insisted that a distinct hazard is entailed in the massaging of prostates in patients known to have tuberculosis elsewhere in the body. He has seen 2 cases of acute miliary tuberculosis follow such treatment. Perhaps it is too sweeping to say that in tuberculous subjects prostates should never be massaged, but certainly there should be something more important than the presence of pus in the prostatic secretion to tempt one to resort to massage. It is justifiable in such patients as present no evidence of prostatic tuberculosis, to carry out gentle prostatic strokings in the presence of chronic gonorrheal prostatitis, or where the definite systemic symptoms are proved to be due to the absorption from prostatic pus. Such manipulations should never be done for longer periods than necessary to accomplish the object sought. The presence of non-gonorrheal pus in their prostatic secretions should be disregarded.

The Fibroid and Hypertrophic Prostates.—The former are small

and very dense to palpation, and are occasionally accompanied by referred pains in the penis, perineum, rectum, or inguinal regions, which is not relieved by massage. The latter are recognized by their size and consistency and accompanying vesical symptoms. In them massage does neither good nor harm.

XXXIII. THE CAUSES AND PREVENTION OF GONORRHEAL EPIDIDYMITIS

Gonorrheal epididymitis is variously stated by different authorities to occur in from 10 to 30 per cent. of all cases of the disease. Having occurred, it is said to render from 23 to 41 per cent. of such individuals permanently sterile. Obviously, a gonorrheal complication of such frequency and far-reaching influences is a very important thing to the human race, and anything that even in a small measure can reduce its incidence is worthy of the closest study.

Of all of the complications of gonorrhea it is probably the most easily preventable, and in order to reduce its incidence, we must have a better knowledge of its causes. We have indulged in much discussion in this regard, and much of it has been rather fanciful. There have been given a number of answers to the question: "How does the gonococcus reach the epididymis?" Most of these have had little to recommend them and, if true, are but rarely so.

Much has been said about lymphogenous and hematogenous transferences of the gonococcus to the epididymal tube. Despite some meager evidence that bacteria injected into the posterior urethra of a guinea-pig may, at times, pass along the lymphatics of the vas deferens, there is little to substantiate the thought regarding man. It is so out of accord with our clinical knowledge, and the histopathology of the disease that it merits but little comment.

Infection by continuity of surface is likewise a very remote possibility. If we accept this as an answer, we must abandon most of our accepted causal factors of treatment and hygiene. There are likewise a number of anatomical and physiological arguments against it. The ejaculatory duct is about 2 cm. long and the

vas deferens is 45, and the gonococcus must spread all of this distance against the current of fluid and the peristalsis of the vas. The development of epididymitis, after the occurrence of known determining events, is far more immediate than could be occasioned by such a mode of bacterial progression, for the disease does not spread such great distances so rapidly. It has also been pointed out in an earlier chapter that long, narrow mucous channels rarely become infected through continuity of surface, despite the fact that they are lined by the most susceptible type of cells. If further argument were needed, it would be but necessary to cite the well-known clinical observation that in at least 98 per cent. of our cases the epididymis is inflamed before the vas deferens; that the vas generally becomes inflamed at its epididymal extremity first.

Of all of the answers to our question we have heard most of reverse peristalsis. In this, too, we can find some decided flaws. To be due to reverse peristalsis, it would be necessary for the ejaculatory duct and the vas deferens to reverse their peristaltic wave while the seminal vesicle underwent its normal mode of contraction. It has been demonstrated repeatedly that substances injected through the ejaculatory duct enter the seminal vesicle before they can pass into the ampulla of the vas. Not only do they enter the vesicle, but, unless of a highly irritating nature, they fill it before anything passes into the vas. Such being the case, it is hardly likely that a peristaltic wave of the ejaculatory duct, if such were possible, could deliver sufficient fluid from the posterior urethra to fill the vesicle. Perhaps the greatest flaw in the thought is the fact that the ejaculatory duct contains no circular muscular-fibers to make a peristaltic wave possible, and without such a wave the theory lacks plausibility. Such a reverse peristaltic wave may occur in the vas deferens, but what danger could it occasion unless the infective material were delivered to its lumen via the ejaculatory duct and seminal vesicle?

With so few things in favor of these theories, and so many stronger arguments against them, we shall do best to look in other directions if we would explain the transit of the gonococcus from the posterior urethra to the epididymis. As the symptoms of the affection generally occur well within twenty-four hours following some definite mechanical event they must be due at first to a toxin response. The implantation of the viable gonococcus could not cause such an immediate reaction. It would, in such an event, be necessary for the implanted gonococci to complete their life-cycle and liberate their endocellular toxin through autolysis. Reasoning from our observations upon the urethral mucous membrane in regard to its toxin responses, there must be delivered to the epididymis some older gonorrheal products rich in gonotoxin to occasion such an immediate response as is usually seen.

Just how does this gonotoxin-laden pus reach the epididymal tube? To answer this question, let us see first what we long have believed regarding certain predisposing or determining events. Of the occurrences most likely to be followed by epididymitis, according to our text-books, are "the rough and unscientific use of instruments in the posterior urethra, irrigations or injections forcibly given, sexual excitement and excesses, violent physical exercise, digital manipulations of the prostate and seminal structures, or great increases of intra-urethral and intravesical pressures." for sexual excitement seems not to be a factor if the bladder is empty. Briefly, some mechanical transference of purulent products from the one point to the other.

The way through the conducting structures, from the posterior urethra to the epididymis, is long and tortuous, and such a method of transporting gonorrheal pus at first seems questionable. Let us see what other data have been gathered in favor of it. It has been shown repeatedly by the roentgenograms of substances injected into the seminal vesicle, via the ejaculatory duct, that in some individuals, after the vesicle is entirely filled, some of the

solution finds its way down into the vas deferens (see Figs. 63 and 64). This in itself proves that, where the pressure is sufficient, fluids can be made to reach the epididymis, and all of our physical causes mean such pressure.

There is, however, greater proof to be found in Belfield's report of his experiences following his operation of vasostomy. This operation is done by making an opening in the vas deferens, just below its point of emergence from the inguinal canal, for the injection of germicides into the seminal vesicle. It was his observation that in a number of such individuals a few drops of urine would ooze from the opening in the vas when the bladder was quite full. Such an observation seems to give us the best answer to our question. If urine can come from the bladder into the posterior urethra, ejaculatory duct, seminal vesicle, and find its way to the junction of the middle and lower third of the vas deferens, it should have no more trouble in reaching the epididymal tube. After some years of observation the writer is of the opinion that such is the only worthwhile explanation of the matter in almost all cases, and offers us simple means of preventing epididymitis by avoidance of the things that could act as a cause.

It has been the writer's experience to have some urologists combat such a simple explanation of the matter, and use as arguments against it their experiences with epididymitis following prostectomy. But little study is required to show that their experiences offer almost incontrovertible argument for direct pressure transference of infection. They directly manipulate the subvesical structures at operation, and few bladders are subjected to greater internal pressure than those of the "prostatic." But they say, "It is some days before there are any signs of inflammation of the epididymis." There should be, for they are not dealing with a micro-organism the toxin of which produces an almost immediate toxin response. It should take three or more days for it to develop from the direct implantation of the bac-

teria concerned. They cite the occurrence of epididymitis following the use of an indwelling catheter when there is no increase of intravesical pressure. Investigation of such cases probably will show that the epididymitis occurred within the first five days of the presence of the catheter, and that the infection really followed the first efforts to empty the bladder. As further argument they speak of the cases occurring long after prostatectomy. It should not be forgotten that most of this latter class occur shortly after the establishment of urethral urination, at a time when the postoperative swelling of the posterior urethra has subsided, so that the torn or untorn ends of the ejaculatory ducts are no longer closed by such swellings. If more argument were needed, they have supplied it by showing that postoperative epididymitis does not occur if they ligate and sever the vasa deferentia before prostatectomy.

In addition to these proofs offered us by these surgeons, let us see what other arguments we have in favor of the mechanical transference of pus from these two points, for, if we are correct, the prevention of the complication should become a simple matter. We should merely have to avoid certain faults of treatment, and have the patient avoid certain faults of conduct to obliterate epididymitis. After a number of years' experience the writer is convinced that such a result is easily obtained. The matter being of such far-reaching importance, a recital of our points of proof is not without value.

1. Urine passes down the vas deferens in some individuals when the bladder is full.

2. Unless of the nature of a chemical irritant, which Lespinasse has shown, throws the vesicle into spasm, fluids coming via the ejaculatory duct balloon the seminal vesicle before passing into the vas.

3. It is, therefore, obvious that the amount of fluid must be large unless the vesicle already is full.

4. It is common knowledge that in many patients the internal vesical sphincter relaxes when the bladder is quite full, particularly if the intravesical pressure is raised, and the posterior urethra becomes virtually a part of the bladder cavity. Its purulent contents therefore are subjected to the same degree of pressure.

5. The ejaculatory ducts are freely patulous in some individuals, as evidenced by the presence of spermatozoa in their morning urines in the absence of an orgasm.

6. The ejaculatory ducts present no musculature that could occasion a reverse peristalsis.

7. The vas deferens and ampulla offer too many obstacles to such a rapid spread of infection by continuity of surface, and in order to receive the infection the vesicle must first be supplied with it.

8. The histories of these unfortunates usually will show that within twenty-four hours preceding the onset of epididymal symptoms they indulged in coitus, sexual excitement, or strenuous exercise with a very full bladder; that some form of treatment was carried out that either enormously raised intra-urethral and intravesical pressure, or that pressure was made on the seminal vesicles so that infective material delivered to them by the former was forced into the vas deferens and on to the epididymal tube.

Such overwhelming evidence in favor of a truly mechanistic view of the determining causes of epididymal involvement by the gonococcus is a highly fortunate circumstance. We have but to find a way to avoid certain things and we at once reduce the complication almost to a point of obliteration. Fortunately, too, the treatment factors that must be avoided are those that should be avoided regardless of epididymitis, for they are generally too strenuous for a disease requiring the utmost gentleness for its cure. Further, the restraint that must be placed upon the patient if he would avoid the complication is of a nature that should not cause him to rebel once he is made to understand its importance.

If the following rules are carried out by the physician in his treatments of posterior urethritis and its concomitant prostatitis, and by the patient in his daily conduct, the present incidence of gonorrheal epididymitis will practically cease to be:

Fig. 63.—Roentgenogram of the seminal vesicle, ampulla, and vas deferens. The fluid has been injected through the ejaculatory duct and, after filling the vesicle, has passed along the vas deferens at least as far as the arrow on the lower left of the picture. (Courtesy of Dr. O. S. Lowsley.)

1. Patients should be carefully warned against indulging in sexual excitement, coitus, or strenuous physical exercise during the existence of posterior urethritis, particularly if the bladder

is full. It is extremely doubtful if either will occasion epididymitis if the bladder is empty.

2. Nothing should be injected into an acutely inflamed posterior urethra until the patient entirely has regained his vesical comfort. The vesical spasm occasioned thereby is often a matter of danger.

Fig. 64.—Roentgenogram of the seminal tract. The injection was made into each vas deferens, and the fluid has dilated the proximal structures on both sides and escaped via the urethra into the bladder. On one side it has passed into the epididymal tube. (Courtesy of Dr. Harry C. Rolnick.)

3. When the local treatments are instituted following acute posterior urethritis, the irrigating fountain should never be more than $3\frac{1}{2}$ feet above the urethral level, and the bladder should not be fully distended with the fluid.

4. No instruments should be passed into the posterior urethra during the presence of the gonococcus, except for the relief of

complete urinary retention where one at times has no choice of action.

5. Digital manipulations of the prostate and seminal vesicles never should be performed until long after all acute symptoms have subsided. They should be done with care and caution so long as the gonococcus is present.

6. The utmost gentleness in every form of treatment, keeping constantly in mind the dangers of high pressure of any type, will be the means of obliterating epididymitis as a doctor's misfortune, and proper instructions to the patient will greatly reduce it as resulting from the patient's fault. Both likewise will prevent most of the other complications of gonorrhea that help to make it such a formidable disease.

XXXIV. THE TREATMENT OF GONORRHEAL EPIDIDYMITIS

Of late years much has been said regarding the surgical treatment of gonorrheal epididymitis. A number of urologists have gone so far as to say that epididymotomy should be done in all acute cases. Their strongest argument has been the early cessation of pain. They have not, however, been able to demonstrate that the after-results of such a procedure have been any better than are obtained by non-surgical measures. While it must be admitted that those cases developing definite abscesses of the

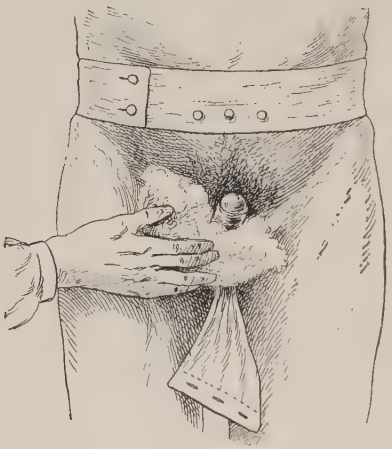


Fig. 65.

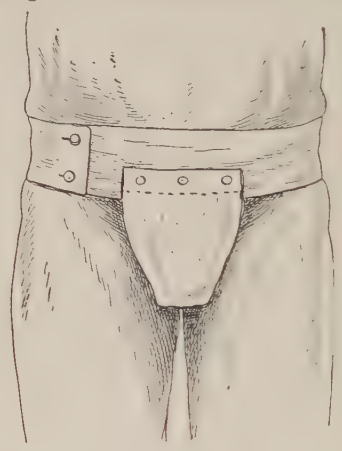


Fig. 66.

Figs. 65, 66.—In the use of the jock-strap the scrotal contents are pushed forward on a nest of cotton and the anterior flap is drawn over them. The waist-band is pulled well up so as to exert support and pressure. Both are best obtained with a smaller size than would be used ordinarily for the individual in question.

epididymis demand surgical drainage, there is little probability of epididymotomy's becoming a general procedure. Nor is there any need that it should.

The older method of placing all of these patients in bed with the scrotum supported upon an adhesive plaster bridge is also

extreme. True, those with marked elevation of temperature should be placed in bed, but, fortunately, such temperature disturbances are the rarity and not the rule. By far the greater number can be treated as well by methods allowing them to remain ambulant. Operating upon or otherwise restraining these patients has marked disadvantages, for it is rare, under such conditions, that the desired secrecy regarding the condition can be maintained.

It is really surprising how most of these patients can be kept in comparative comfort by a properly fitting dressing that gives not only support but slight pressure. In the milder cases these are satisfactorily accomplished by the use of a nest of cotton and a tightly fitting athletic jock-strap. In the more severe cases a double spica bandage properly applied will do better. The so-called Blockley bandage (see Fig. 67, A-F) has been used for a number of years in a dispensary with which the writer is familiar, and has rarely failed to give comfort and make it possible for the patient to continue with his occupation. This bandage should be tightly applied with the scrotal contents pulled well forward and upward. There should be a large cotton pad between the scrotum and the bandage, and the latter should be fastened with safety-pins and adhesive plaster to prevent its loosening. Properly applied it should remain for at least ten days, unless it becomes loose, when it should be reapplied. At the end of this period it is generally well to remove it, and have the patient wear a tight-fitting jock-strap until all of the soreness and most of the swelling has gone.

The application of the various counterirritant ointments may do some good, but most patients do almost, if not quite, as well without them. The odor of most of them is unpleasant, and it is a question how much they aid the really remarkable results obtained by nature with this complication.

The duration of the condition is about the same under all methods of treatment, so that the simplest forms that allow the

Fig. 67, A.

Fig. 67, B.

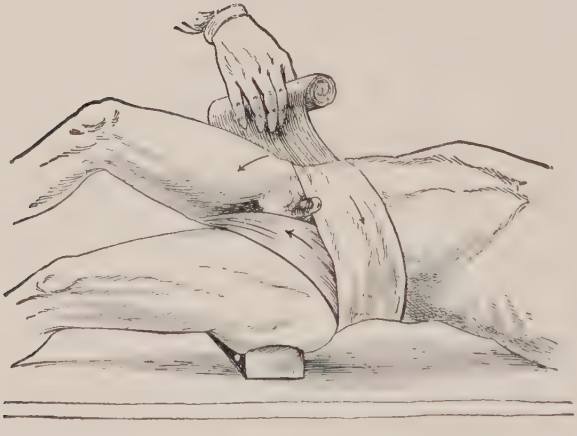


Fig. 67, C.

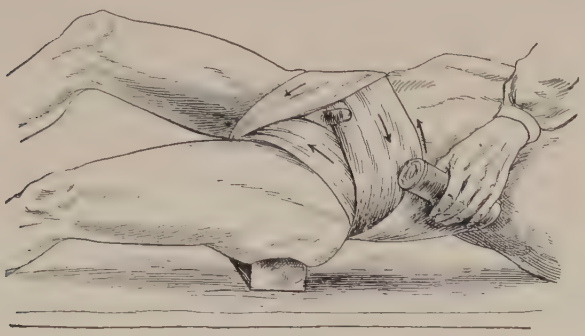


Fig. 67, D.

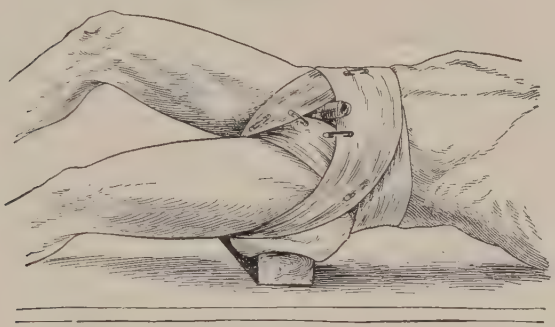


Fig. 67, E.

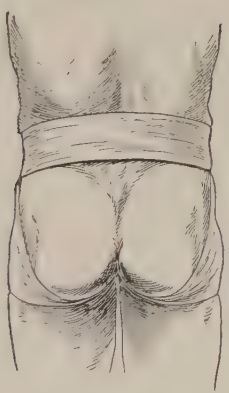


Fig. 67, F.

Fig. 67, A–F.—To apply the Blockley bandage (a 6-inch muslin bandage is used) a block or several books are placed on the table to raise the buttocks. The scrotal contents are covered with a thick layer of absorbent cotton and pulled well upward toward the pubis. The various turns of the bandage are shown in B, C, and D. In E and F are shown the front and rear views of the completed bandage.

patient to pursue his daily routine have most to recommend them. Some type of support should be worn until the swelling almost entirely has subsided. Local treatment to the posterior urethra and prostate is best withheld for at least several weeks and should be begun with the greatest caution.

The treatment of this complication by diathermy has many adherents. The possibility of causing atrophy of the testicle looms as a factor calling for thought and caution. The pressure bandage does not cause such a disastrous result and, properly used, is safer.

XXXV. GONORRHEAL SEMINAL VESICULITIS

A SEARCH of the statistics upon gonococcal seminal vesiculitis is prone to give one the impression that it is a frequent condition. By some it is said to occur in almost every case in which the posterior urethra and prostate become infected, while others are far more conservative. The explanation of this great difference of opinion rests in the difficulty experienced in making an accurate diagnosis of the condition. The conservatives demand real evidence before making a positive diagnosis of seminal vesiculitis, whereas the others seem to take almost everything as proof of its existence.

Except in the extremely rare fulminating cases of acute seminal vesiculitis there are few urogenital lesions that offer more real difficulty in diagnosis, considering the fact that the organ can be palpated with comparative ease. If one holds to the older dictum that "a diseased seminal vesicle is always palpable, and a palpable one is always diseased," he will, of course, meet with many cases. His margin of error will be at least 95 per cent., and he will include in his diagnosis of vesiculitis all of those whose vesicles have not been evacuated recently. If, on the other hand, he demands incontrovertible evidence of infection of the seminal vesicle, his opinion of its incidence will be between 2 and 5 per cent. of all cases with posterior urethral involvement.

It has been pointed out in our consideration of epididymitis and elsewhere that the infecting material occasioning this complication passes into the seminal vesicle before it finds its way via the vas deferens to the epididymal tube. From this it will be seen that the two complications have etiological and preventive factors that are common to both. As these have been covered

rather extensively under the subject of Epididymitis, it is of little use to repeat them here.

The disparity between the incidences of epididymitis and proved seminal vesiculitis is such as to raise a number of very pertinent questions when one considers that both are exposed to the same infecting material. That both are exposed admits of little doubt, and that the seminal vesicle usually escapes true infection is clearly written across the clinico-pathological picture of such complications.

We are so limited in our power of accurate diagnosis of this lesion that we could probably learn more regarding the frequency of its occurrence from the clinical responses than from the other subjective and objective signs. Let us then see what we have, from a clinical standpoint, to prove or disprove the existence of seminal vesicular infections by the gonococcus. A mucosal sac that is so poorly drained as the seminal vesicle offers an ideal place for the storage of the products of gonococcal death. Within a few days the vesicular contents should be extremely rich in gonotoxin, and, if emptied by ejaculation or digital pressure into even the mildly quiescent urethra, they would within twelve hours produce a purulent response. They would continue to do this, at least until very late in the disease, every time evacuation of the vesicle took place.

There are apparently some few patients in whom there occurs a virtual overflow of retention; in whom the vesicular contents ooze into the posterior urethra independently of orgasm or digital manipulation. In them there should occur a prolonged urethral discharge as the result of such a constant feeding source. It is clinically evident that this does not account for any great number of prolonged discharges, nor mask a great number of unrecognized cases of seminal vesiculitis.

Reasoning from what we have seen of gonorrhea in poorly draining mucous structures, we could only expect chronicity of infection in one that emptied so rarely, so that, once infected,

chronicity would be the invariable result in the seminal vesicle. We really have little evidence to support the thought that chronic seminal vesiculitis is a common condition. Were such the case our patients would experience a profuse purulent response following every evacuation of the vesicular contents. Each nocturnal emission, providing the vesicle could empty, would occasion one or two days of urethral discharge, a thing it most signally does not do in a vast majority of cases. It has been observed that nocturnal emissions with extreme rarity occasioned such a toxin response, and that, if they did, one should strongly suspect the presence of seminal vesiculitis.

We cannot explain the absence of such a toxin response by the thought that the ejaculatory duct in such cases is not patulous, for it is usually a simple matter to obtain the contents of the two vesicles separately. Consequently, we are forced to accept one of two views: either the seminal vesicle has so much native resistance that it very rarely becomes infected by the gonococcus, or else, being in the seminal vesicle, changes the characteristics of the gonococcus and its toxins. As we cannot believe the latter we are forced to accept the former, and view gonorrheal seminal vesiculitis as an uncommon occurrence.

Being much less common than we have been led to believe does not mean that we can in any sense disregard it, for, when it does occur, it is a lesion of gravity that must be cared for. Our first great difficulty rests in determining its existence. In the markedly acute cases palpation is a distinct aid, for above the lateral prostatic lobe will be felt a large, sensitive, elongated, soft mass, hot and possibly throbbing. There may be considerable vesical discomfort and tenesmus, which differs little, if at all, from that due to the concomitant urethrocystitis, and of which, indeed, we are likely to consider it a part. Pain in the rectum and along the vas deferens may also be present, together with a mild grade of fever. Bloody seminal emissions, though highly

diagnostic in the presence of acute conditions, are of infrequent occurrence. Such an acute inflammation precludes the possibility of studying the vesicular contents, as digital stripping of the vesicle at this time is a highly dangerous procedure which, if tried, will be greatly regretted.

In the presence of chronic seminal vesiculitis no such limitations in diagnostic procedures exist, and if vesicular stripping is carefully carried out it will rarely be productive of harm. The microscopic study of these secretions is at times confusing, owing to the pus expressed from the prostate at the same time. If one massages the prostate first, and has the patient void some urine to cleanse the urethra, he can express the contents of one vesicle, and, after the patient again cleanses the canal, he then can strip the other vesicle. In this way much confusion can be avoided. The specimens obtained can be studied under the high-power lens in the fresh condition to determine the presence or absence of pus. Pus cells suspended in prostatic secretion floating around the edges of the vesicular contents should be disregarded, and only those clumps of pus definitely entangled in the jelly-like fluid need be taken into consideration. Even here one's judgment often is taxed, and it is well to make sure that it is not prostatic pus by determining the absence of lecithin bodies.

Should the ejaculatory duct be closed no secretion can be obtained, and the usual uncertainties of palpation make it necessary that the diagnosis be made by exclusion. As the prostate is always infected in such cases, exclusion is prone to be fallacious and the accuracy of diagnosis is reduced to guesswork. For this reason thought should be given to the stripping of the vesicle during prostatic massage in the stages of chronicity.

The treatment of seminal vesiculitis in its acute stages differs markedly from that of the chronic condition. The former must be carried out with the utmost care and gentleness. Rest, rectal heat, and sedative drugs give the best results. No digital manip-

ulation should be performed until weeks after all acute symptoms subside.

Upon extremely rare occasions surgical drainage of the acutely infected vesicle may be demanded, but there is little to show that such is the best mode of treatment in all cases. There is, in fact, more reason to think that surgery should be a matter of last resort in chronic vesiculitis, and only to be used when it has been proved that a long course of local treatment does not cure the given case. In most cases the vesiculitis, if the vesicle is really and properly stripped, will clear up along with the associated prostatic infection. Owing to the convolutions of the seminal vesicles, adequate surgical draining is by no means a simple procedure, and often is not entirely curative. In the presence of retained pus causing distant symptoms through its absorption surgical drainage is often striking in its results. There is, however, good reason to believe that seminal vesiculectomy, if possible, would be a better procedure even in these cases. The neurotic conditions that so commonly follow operations upon these structures should make one rather cautious about advising them in patients with such tendencies.

XXXVI. THE CAUSES, PREVENTION, AND TREATMENT OF GONORRHEAL COWPERITIS

Acute infections of Cowper's glands are confined practically to those patients whose anterior urethræ have been subjected to great distensive force. That such conditions are not due to true infections through continuity of surface, but to back-pressure transference of gonococci is clearly in evidence. At least 90 per cent. of the patients who present this complication are the victims of urethral strictures of small caliber. A small percentage have a pin-point urethral meatus, and the rest have been subjected to urethral injections or irrigations at high pressure.

It is, therefore, clearly evident that the prevention of gonococcal cowperitis rests in the prevention of urethral strictures by gentleness, the prophylactic dilatation of the urethra following each attack of gonorrhea, the correction of pin-point meatus, and the avoidance of high-pressure urethral treatments.

The complication is rarely seen in a well-conducted office practice, but is confined mostly to those patients in dispensaries who have neglected strictures known to exist. By far the greater number are seen in the negro. When present, the infection usually breaks through the gland capsule and points toward the perineum at its own side of the urethral bulb. Such an abscess usually destroys the corresponding gland, as it is rare to find a chronic infection in a Cowper's gland that has suppurated.

It is apparent that there are at times less active infections, wherein the gland does not become abscessed. Under such circumstances, through poor drainage possibilities, there remains a chronic infection acting as a feeder to a secondary chronic anterior urethritis. Such an anatomical structure offers a highly favorable opportunity for prolonged gonococcal infection. Draining, as it

does, through a long, narrow canal, it should be possible for the gonococcus thus located to retain its viability for long periods of time. Though not a common complication, cowperitis always should be

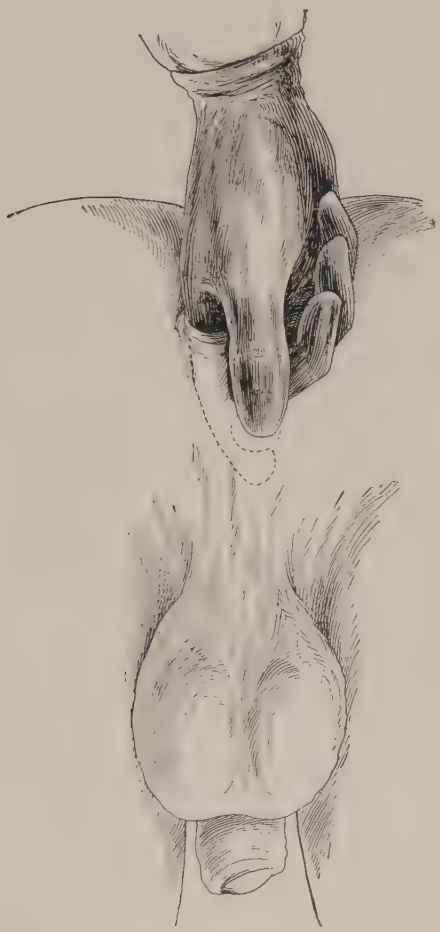


Fig. 68.—Method of palpating Cowper's gland.

borne in mind as a possible cause of chronic anterior urethritis, particularly in the absence of prostatic infection.

Such a cause of chronicity is most commonly overlooked, for it is not generally known that an infected Cowper's gland can be palpated. Normally the gland cannot be felt, so that it is safe to

state that a palpable gland is a diseased one. In order to map out the gland the finger is introduced into the rectum and pressed into the fossa, just within the anal sphincter anteriorly on each side of the membranous urethra. The thumb is placed to the corresponding side of the bulb externally, as is shown in Fig. 68. By rolling the tissue between the thumb and finger an enlarged gland readily can be discovered.

The treatment of suppurative cowperitis is incision and drainage. Chronic infection of the gland is perhaps best treated by excision. With the finger in the rectum, it is a simple surgical procedure to remove such a gland through a lateral perineal incision. Treatment by digital massage is rarely successful, and if it does succeed, it is only at the expense of a very prolonged course of treatment.

XXXVII. THE RELATION OF LYMPHOCYSTIC URETHRAL LESIONS TO GONORRHEA

Upon several occasions[1] the writer has published articles regarding the relation of certain lymphoid and cystic bodies occurring in the posterior urethra to tuberculosis elsewhere in the body. In the last of these papers were given the histories of and findings in 75 cases showing such a tuberculous lesion. The statement then was made that, as 83.3 per cent. of the cases offering oppor-

Fig. 69.—The most usual locations of lymphocystic urethral bodies.

tunity for close study presented positive evidence of a mildly active tuberculosis somewhere in the body, it was fair to suppose that all of them had tuberculosis. It then was felt that such was the case, but time and experience have served to modify this view to some extent. The present feeling is that while tuberculosis is

[1] New York Med. Jour., October 16, 1915; Journal of Urology, August, 1917; March, 1922.

the etiological factor in by far the large majority of them, there seem still to be cases in which this disease is not present or, if present, is undemonstrable.

Attention was drawn to the fact that there was in such patients a concomitant prostatitis which could not be cured so long as the urethral lesions were present. Having a prostatitis, many of them presented the morning urethral discharge and urinary picture so common to prostatic inflammation. It was at that time the writer's view that such cases should be placed upon a mild antituberculous régime, as the urethral bodies generally disappeared spontaneously as the patient's health improved. As several

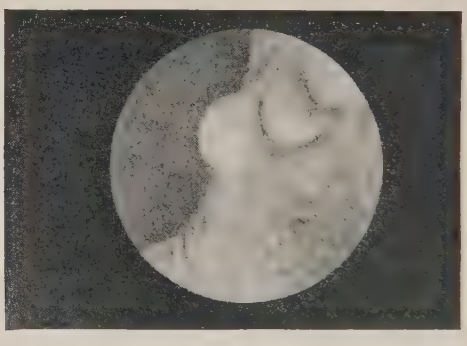


Fig. 70.—Lymphocystic bodies at and distal to the margin of the vesical outlet.

cases of massive tuberculosis had occurred in these patients following prostatic massage, its performance was and still is condemned until after the urethral bodies have disappeared. It, however, has not been deemed wise, of late, to await the disappearance of these bodies, as experience has taught that they can be destroyed quickly by electric fulguration, or the direct application of 50 per cent. silver nitrate solution through the endoscope. Having been destroyed in this manner, no risk seems to be entailed by efforts after a few weeks to clear up the prostatic inflammation.

Though mainly of importance regarding their association with tuberculosis and chronic prostatitis in some patients seemingly

non-tuberculous, lymphocystic lesions at times become a matter of decided importance in the prolongation of gonorrhea. Observation of a large number of such cases since 1914 has afforded opportunity to follow not a few of them through attacks of gonorrhea, and to study the behavior of the disease in them. Collectively they have done no better than other cases, and where the gonococcal infection did not extend to the posterior urethra they have done no worse. In those unfortunate enough to have a posterior

Fig. 71.—Profile view of cysts of the vesical margin.

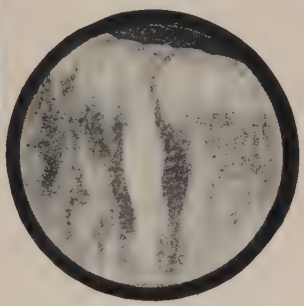


Fig. 72.—Fusiform lymphocystic body on the prostatic declive.

infection, there has been no greater discomfort than in similar cases lacking the lymphocystic bodies, but the urethral discharge and the clouding of the second glass of urine has continued for greater periods than are usual. Their improvement is decidedly slow and gradual. For weeks they remain in a comparatively stationary stage characterized by a decidedly cloudy urine, which seems to take an almost endless time to subside into a "shred stage."

The prostatic infection in these patients seems more severe than in most others, and from a therapeutic standpoint they pre-

sent decided difficulties. Even gentle stroking of the prostate at a time when it is safe in others is likely to produce great discomfort, and a profuse toxin response that lasts longer than it should. The writer's decided disinclination toward carrying out prostatic massage in the presence of these lesions has led him to adopt an attitude of great caution. The routine has been to carry out little prostatic manipulation, but to leave as much to the patient's own immunity processes as they could possibly care for. To leave the prostate untouched, however, allows of a stage of such prolonged gonococcal colonization in the gland that one infers that cure will not result unaided.

The custom has been to carry out intravesical irrigations with 1 : 5000 potassium permanganate in these individuals until there were no longer signs of great activity. When it was felt safe to attack the prostate, gentle strokings were made over the lateral lobes about once a week, but not over the urethral line. The toxin response was then quieted down by the use of intravesical irrigations. After varying periods in different cases the prostatic strokings failed to cause further recrudescences of symptoms, and in so far as the gonococcal infection was concerned it gradually disappeared.

No effort was made to carry out the usual type of prostatic massage with the idea of rendering the gland free of all purulent infection, as it was known this could not be done so long as the urethral bodies were present. When there was every reason to feel that the gonococcus was no longer present the gentlest passage of a sound was carried out upon several occasions. If this brought about no purulent response, the endoscope was passed and the lesions destroyed with 50 per cent. silver nitrate. This usually took several treatments, and after an interval of three weeks following their entire removal the prostatic treatments were resumed in the same manner as is used in uncomplicated chronic prostatitis.

XXXVIII. EVIDENCES OF CURE

THERE are few studies more worthy of the closest care than those aimed at pronouncing a patient cured of gonorrhea. Much of the gonorrhea that exists today is the result of carelessness in this regard. The dreadful consequences of pronouncing a patient "cured" when he really harbors gonococci should weigh heavily upon the physician's mind. Such errors are far too common and have almost no excuse for being. They commonly are based upon a macroscopic study of the urine alone. In them the marked tendency of the gonococcus to colonize and lie dormant in the smaller mucous channels is entirely forgotten. As a matter of fact, a clear urine is very common in patients who are not cured, and will not be for months.

In our determination of cure we must keep in mind certain rather fixed characteristics of gonococcal infections, always remembering that most of them find their exceptions in certain individuals. These points have been mentioned previously in our text, but will bear repetition in the present connection.

The point of greatest importance is, perhaps, the fact that the mucosa of the anterior urethra in almost all individuals remains highly sensitized to gonococcal toxins. Being so sensitive to them it constitutes our best single index of cure. It almost invariably will show a purulent response within twelve hours of being subjected to these toxins. Consequently, it is only necessary by some means to cause the emptying of retained gonococcal products to prove that the patient is not cured. In some few patients this purulent response is so scanty that it only can be demonstrated by a vigorous stripping of the urethra or a careful microscopic study of the urinary sediment. In an extremely small number of individuals it does not occur.

There are several means by which these areas generally can be made to empty their contents into the lumen of the urethra. In the prostate, seminal vesicles, and Cowper's glands digital massage is generally sufficient. For the smaller crypts of the urethra massage over a full-sized sound usually will suffice. Such procedures should be done upon several occasions, as a focus that does not empty at one effort may do so on another. If the gonococcal products do not escape into the canal, there will be no recurrence of discharge. In some patients the administration of a large dose (200 to 500 million) of gonococcal vaccine, together with the above manipulations, will bring about the desired result. The writer cannot refrain from repeating a few words of caution regarding the wisdom of using the other means of determining probable cure before resorting to such a large dose of vaccine. The marked reduction in immunity brought about at times by it makes the recurrence, if occasioned, a difficult thing to cure. Vaccine should be the last thing used.

Should the other means above mentioned be unproductive of any macroscopic or microscopic evidences of infection, the use of alcoholic drinks may bring about a recurrence. Some may be loath to try this experiment, yet it is of obvious practical value.

It happens at times that none of these measures will cause such a response, and yet the patient is not cured. The closest study of the urethral mucus, prostatic secretion, and seminal fluid may fail to reveal the gonococcus. The disease lies dormant in some small channel until such time as the patient indulges in prolonged sexual excitement or actual coitus, when it reappears in him and probably infects his partner. Such a possibility must always be borne in mind, so that, no matter how exhaustive one's study may have been, he is unwise in pronouncing a patient cured. *A better way is to inform him that, having responded negatively to our best tests of cure, he is probably well, but, as our evidences of cure are purely inferential, there is always the possibility of error.*

For this reason he should not indulge in sexual relations for at least three months without the use of a good condom. If there is no recurrence within three months, which have included coitus and other activities, there will be none. He owes it to others, however, to protect them from infection if it does recur during this period.

It is unfortunate that our complement-fixation test offers us so little of practical value in this regard. It has, however, been shown that some patients with active, prolonged gonorrhea never have a positive blood-test, while in others it remains positive for months after a cure has been obtained. While of great value in the diagnosis of some few metastatic gonorrheal complications, our blood studies leave much to be wished for from the standpoint of proving cure.

The isolation of the gonococcus by cultural methods in these apparently cured cases is one of the most difficult of laboratory procedures, in which errors are just as liable to occur one way as another. The method as a proof of cure is talked of most by those who have tried it least. If surely positive it is of value, but it very rarely is surely positive. There is a vast difference between isolating the gonococcus from these cases and from those presenting an acute discharge.

Briefly stated, our safest and most practical evidences of cure are as follows:

1. Entire absence of purulent urethral discharge.

2. Microscopic absence of gonococci from the urethral, prostatic and seminal fluids, and urinary sediments.

3. Inability to cause any purulent discharge after several efforts by the passage of sounds, with massage of the entire anterior urethra upon them, and the digital massage of the prostate, seminal vesicles, and Cowper's glands, as well as the hypodermic injection of gonococcal vaccine (200,000,000 to 500,000,000).

4. Lack of recurrence within three months upon resuming a mode of life that includes alcohol and coitus, particularly the latter.

XXXIX. NON-GONOCOCCAL URETHRITIS

While a consideration of acute and chronic urethral discharges that are in no sense of gonococcal origin may not seem germane to such a series of discussions, they so commonly are mistaken for gonorrhea that it would be a grave omission if they were not included. There is a rather wide-spread impression that they are of rare occurrence, whereas the reverse is really the case. So many things can occasion a urethral discharge that it is remarkable that non-specific urethritis is not more common than true gonococcal urethritis, that has only one cause.

The diagnosis of gonococcal urethritis is a simple matter when compared with that of the non-specific variety. In the former one only has to find the gonococcus. In the latter he must make repeated searches to be sure that the gonococcus is not present, and even then often is assailed by doubts lest it be present and he has missed it. The solution of the true cause of a given case of non-specific urethritis offers no such simplicity as is enjoyed in gonorrhea. Though one may find various bacteria present in the stained smear, he even then is far from the complete answer, and must delve carefully into the patient's history and present pathology in the hope of finding it. Lacking it he is at a great disadvantage, for cure so commonly depends upon the removal of the etiological factors.

In our consideration of the subject we perhaps should do best to view the urethra as a canal that usually harbors, without harm to itself, most of the bacteria that are found in non-specific inflammations. Harboring them, as one might say, normally, there must occur some exciting factor to disturb this happy state of affairs, to reduce this rather constant immunity and sensitize

the mucosal surfaces to the toxins they have known so long. And it is in the determination of these exciting factors that we find an immediate broadening of the investigative field. Though we usually begin by the determination of the particular micro-organism present in the discharge, we err if we let that knowledge occupy too large a place in the picture.

The anterior urethra, for it is this portion of the canal from whence the discharge arises, is a very well-behaved portion of the body under normal conditions. In the absence of an exciting cause it does not produce pus. Further, that cause is seldom solely the presence of the bacteria found in the discharge. (The exceptions to this are gonorrhea, chancre, chancroid, and tuberculosis, the last three of which are extremely rare, and neither of which really should be called "non-specific.")

The urethral mucous membrane has the peculiarity of developing a prompt purulent response to almost any type of irritant. The degree and duration of this purulent response depends upon the strength of the irritant and duration of its action. The greater the irritation, the greater and more continued are the evidences of it. If the irritation is not great and is of brief duration, the evidences of it, as a rule, are not great, and they rather promptly disappear. If mild irritation is often repeated, the resultant discharge may continue over a great period of time. Under this last condition, or where the strength of the irritant is almost or completely cauterant, a change takes place in the lining cells of the canal. A protective type of epithelium, squamous, replaces the normal columnar cells. There is, at times, such an overproduction of squamous cells that they desquamate in large numbers, occasioning a discharge that cannot be differentiated macroscopically from pus. If the caliber of the canal is narrowed sufficiently to greatly impede the urinary stream, this same protective type of cells replaces the normal cells immediately proximal to the obstruction.

It safely can be said that a chronic non-gonorrheal discharge is due to the continued action of the etiological or underlying cause, and not to the particular bacterial elements present. An unobstructed anterior urethra seldom, if ever, will hold a chronic inflammation in the absence of some continued exciting factor, unless it has been thoroughly devitalized by chemical or instrumental trauma, and even then it shows a marked power to correct these results unaided by therapeutic measures.

Regarding the etiological factors concerned, they can be divided into several groups in the order of their frequency: (*a*) A deeper-lying pathology somewhere in the urinary tract; (*b*) irritants introduced from without; (*c*) idiopathic factors; (*d*) foreign bodies in the canal; (*e*) systemic diseases.

Under the heading of The Treatment of Chronic Gonorrhea we have discussed most of the underlying pathological processes in our most common group causes. Except with the obstructive conditions, such as stricture or narrowed external meatus, practically all chronic and most acute discharges under this particular heading are secondary to infections in the smaller mucous channels emptying into some portion of the urethra. As by far the greater number of such feeding infections are located in the prostate gland, the diagnosis and cure of most of them depends upon the diagnosis and treatment of the underlying prostatitis.

While the discharge occasioned by chronic prostatic infection is usually limited to a drop of pus at the meatus in the morning, there are many marked exceptions. The morning discharge of chronic prostatitis frequently is not discovered by the patient until some questionable sexual contact causes him to make a closer inspection of the parts than he usually does. Fright, a guilty conscience, or both, cause him to come to the conclusion, upon the discovery of the presence of pus, that he has gonorrhea, and immediately to seek his physician. Unless the physician studies the discharge carefully, the history is prone to lead him to agree

with the patient and to carry out the treatment and precautions belonging to that disease. In such studies it never should be forgotten that gonorrheal discharges at times show so few gonococci that they are to be demonstrated only after one or more diligent searches.

In contradistinction to those discharges limited to the early morning, it is by no means rare for prostatitis to occasion a scanty or profuse urethral discharge that is present at any hour of the day or night. The profuse discharge of this type is most commonly seen after the rupture of some submucosal pus-pocket in the posterior urethra. Such an occurrence is shown in Case XLVI, Part Two, wherein the prostatic infection was unquestionably secondary to dental foci of infection.

The causal prostatitis may be accompanied by other lesions, such as seminal vesiculitis, infections of the sinus pocularis, or lymphocystic urethral lesions. The prostatic infection may be tuberculous and associated with definite ulcerations of the posterior urethra. In fact, it can be said that almost any pathology in what we call the posterior structures may occasion a non-specific urethral discharge. The same can be said with equal truth of the anterior urethra and its adnexa.

Such being the case, it is obvious that the cure of such urethral discharges rests primarily in the discovery and correction of the deeper-lying causal pathology, and only secondarily, if at all, in the direct treatment of the free urethral mucosa. The correction of this pathology generally will cause the disappearance of the discharge if no treatments whatever are applied to the urethral mucous membrane itself. The exceptions to this are, of course, in those fortunately rare cases that present devitalized areas of mucosa that usually are the results of rough treatment, or where there are definite stricture bands in the canal.

Under the heading of Irritants Introduced from Without must be included those discharges occasioned by trauma to the

urethra, whether instrumental or chemical, as well as those resulting from the effects of irritating vaginal secretions. It might also be appropriate to include that very small group of cases occasioned by unclean preputial sacs, and to which the term "auto-inoculation" has been applied by some writers.

The readiness with which the non-gonorrheal mucosa recovers from the effects of direct instrumental trauma has been alluded to by many. It is, indeed, rare to see a urethra that has been sub-

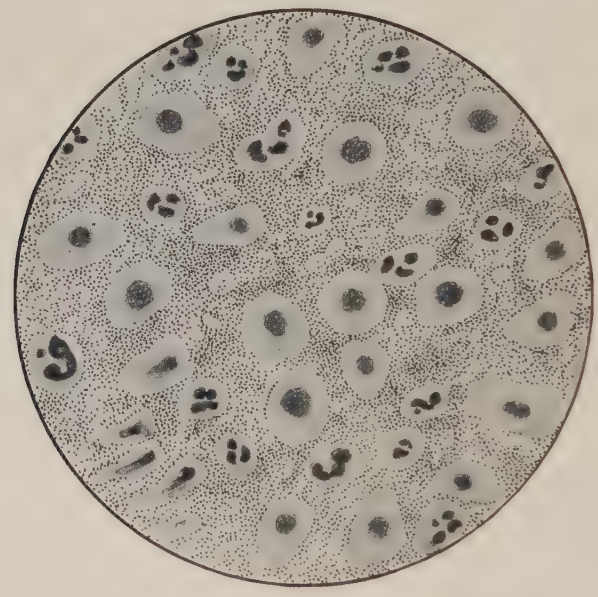


Fig. 73.—The number of squamous cells, the background of bacteria, and the scarcity of leukocytes would suggest old urethral stricture or prolonged urethral devitalization from strong chemicals.

jected to even the prolonged insult of an indwelling catheter continue to discharge for more than a few days after its removal. Should the trauma be carried to the stage of definite tissue necrosis the discharge naturally would be more prolonged, but even then it usually ceases promptly after the complete healing of the necrotic area.

Urethral discharges due to chemical irritation at times follow

efforts at prophylaxis for gonorrhea. They appear within a few hours of the offending injection, and, unless the injected substance has been almost or quite caustic in its action, they usually will subside promptly without treatment. Should the urethra be subjected to many such insults the discharge can be kept up for great lengths of time. In this latter class, as has been cited in the chapter on The Microscopic Interpretation of Urethral Discharges, there are usually many squamous epithelial cells to suggest the true

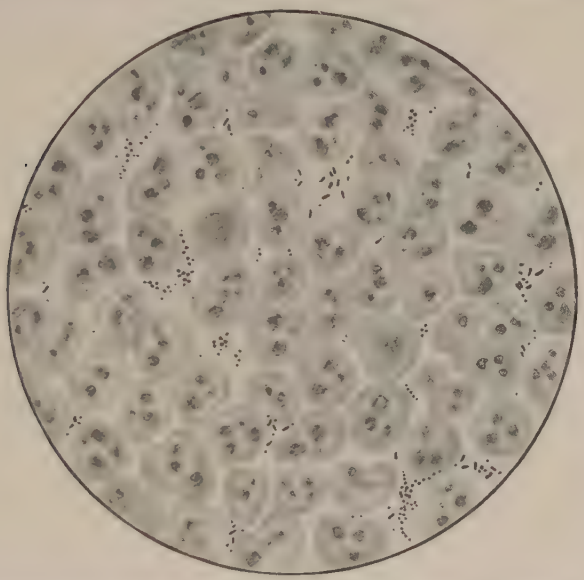


Fig. 74.—Urethral discharge commonly seen as the result of contact with irritative vaginal secretions or secondary to a balanoposthitis.

cause. These discharges are prone to contain many bacteria in contradistinction to the practically non-bacterial discharges occasioned by a single chemical insult.

Of greater interest and, perhaps, frequency in this group are those urethral discharges that are caused by contact with irritating vaginal secretions. As such disturbances are most likely to be occasioned by immediately postmenstrual secretions, and show a rather fixed tendency to disappear promptly, there is commonly

almost a fixed cycle to their appearance which helps in the solution of them. They are prone to exhibit a large assortment of bacteria, and, like the suppurations due to chemical irritants, they practically lack an incubation period, being present within twelve hours of the exposure.

Those discharges due to an unclean preputial sac, where every opportunity is afforded for the development of bacterial toxins

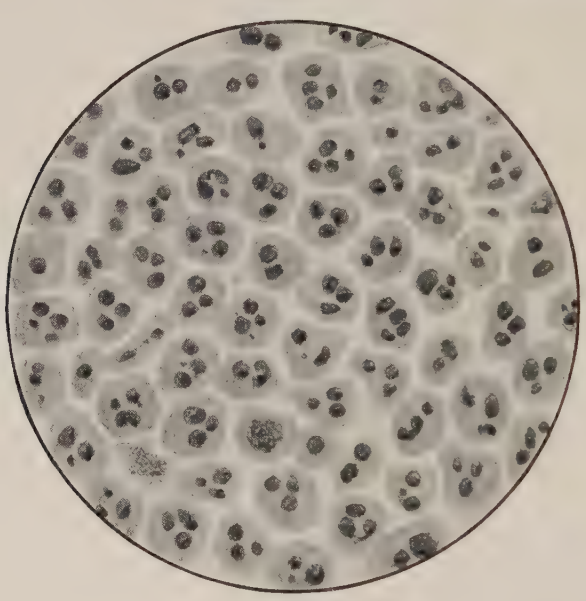


Fig. 75.—Type of discharge commonly seen as the result of chemical irritation of short duration. The absence of bacteria is highly suggestive of such a causal factor.

of a highly irritating character, are usually easy of solution and equally easy to cure. In fact, it can be said that the treatment of this entire group of cases is largely prophylactic. Little difficulty is encountered in curing them when the conditions causing them are corrected or avoided. They then show a decided tendency to disappear spontaneously, but their cure commonly can be hastened by the injection of mild solutions of the same kind and in the same way as are used in the treatment of gonorrheal anterior urethritis.

The next in frequency are those discharges for which we can elicit no definite etiological factors. For there do occur non-specific urethral discharges that cannot be explained by our most careful investigations. A large share of the seeming mystery in their origin is to be attributed to a lack of frankness on the part of the patient, but there still remain a considerable number that are not to be so easily explained. Singularly enough, these com-

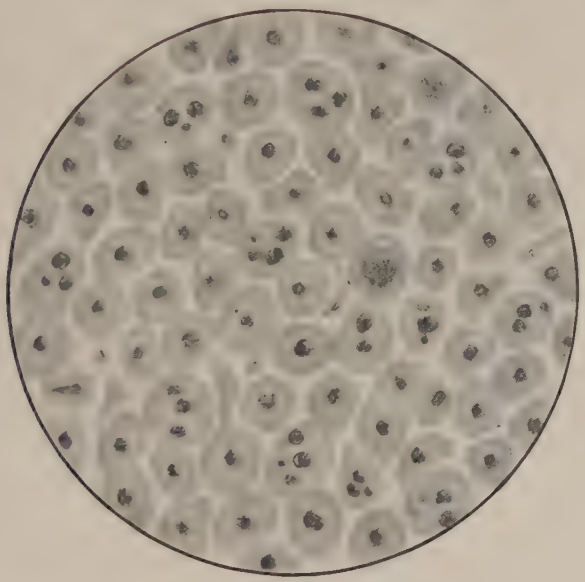


Fig. 76.—Smear indicative of prolonged use of chemical irritant. In the desquamative discharge, seen from a like cause but long after its discontinuance, there usually are bacteria present.

monly are the cases in which we experience most difficulty in producing a cure.

Of the rarest occurrence are those urethral discharges that are to be attributed to the presence of a foreign body or to systemic disease. The former are most commonly the result of urinary calculi or broken catheters that have found anterior or posterior urethral lodgment, or are occasioned by bodies introduced for purposes of masturbation.

Before we knew so much about the rôle of deeper pathology in the production of urethral discharge, we heard more about discharges due to some particular systemic "diathesis." There is considerable question about the occurrence of urethral discharges as the direct and sole result of systemic disease. A close study of the lower urogenital tract will reveal a more plausible explanation in the shape of local pathology in almost every case.

One might add with some reason an ingestive type of urethritis, for there are, upon rare occasions, encountered individuals with apparently normal lower tracts who will experience a scanty urethral discharge on the morning following the ingestion of much alcohol. The older writers also mentioned asparagus, rhubarb, turpentine, cantharis, arsenic, and potassium iodide as possible causes of a urethral discharge, but they must be of the rarest occurrence if, indeed, they ever do take place.

Turning to the question of treatment, the first step should be the determination and removal of the underlying cause, for cure frequently cannot be accomplished otherwise. The local treatment of those cases that are not due to deeper pathology, and that do not spontaneously clear up, differs little, if at all, from that of true gonococcal urethritis. Gentleness of procedure, and the use of non-irritating urethral injections or irrigations, is of almost as great importance as with gonorrhea. It is in this class of cases that 5 per cent. neosilvol injections often act as almost a specific. Many subside promptly after the use of 1 : 5000 permanganate of potash irrigations, followed by the use of 5 per cent. silver nucleinate. Upon those few occasions where these procedures do not cause the subsidence of the discharge, one may obtain results by dilatation of the canal by sounds. Rarely the use of an astringent injection will produce the desired result. With extreme rarity it may be necessary to make topical applications of 1 per cent. silver nitrate solution to limited diseased areas of the urethra through the endoscope.

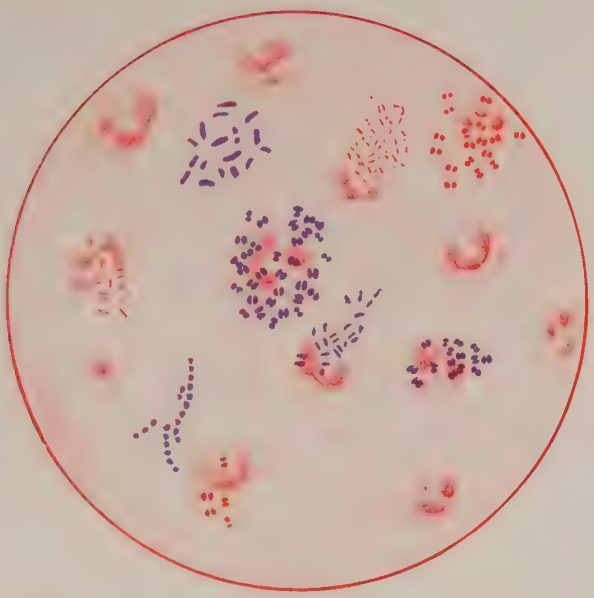


Fig. 77.—Appearance of the more common types of bacteria found in non-gonococcal urethritis. The Gram-negative diplococci are much larger than gonococci and resemble the large Gram-negative forms of staphylococci seen in twenty-four-hour cultures of staphylococci upon cornstarch agar.

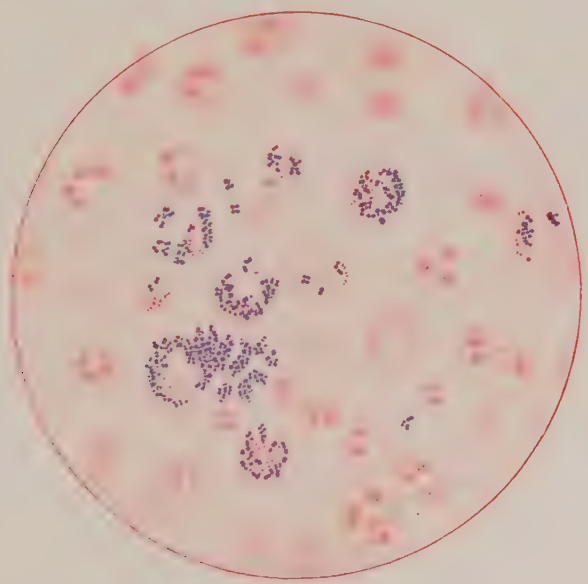


Fig. 78.—Gram-stain smear from urethra of an individual who had never had, and at the time did not have, gonorrhea. The bacteria present were staphylococci, some of which had not developed Gram-positive characteristics and others of which had lost them through partial digestion in leukocytes.

PART TWO

AN ANALYSIS OF CASE-HISTORIES

IN THE ENDEAVOR TO PORTRAY THE DISEASE AS IT IS PRESENTED TO THE PHYSICIAN

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FOREWORD TO PART TWO

GONORRHEA is a disease of contradictions. To almost every rule that has ever been laid down regarding it it offers exceptions. In this respect it is not altogether unique, for most of our rules regarding most human diseases have their exceptions. There are, in fact, very few of the many medical maxims that are based upon other than majorities, and most of them are not to be taken too literally. Medical progress would move slowly, however, if we dwelt only upon these exceptions. It therefore is the better procedure to recognize the immense value of these so-called rules, but to be ever on the alert for their exceptions. In our discussion of the disease in Part One we have tried to outline the various phases of the subject in a way to avoid confusion. In doing this we perhaps have been at times a trifle more positive than the frequency of exceptions would seem to warrant.

As one reads the preceding pages there is engendered the feeling that the picture is really larger than it has been painted, a feeling that something is needed to round out the story in a way to bring out more forcibly the many misleading features of gonorrhea and its treatment. Such a task is by no means easy, for to prolong description would add so much confusion that words would not hold the attention and the message would fail.

Medical instruction has demonstrated that direct contact with patients is of far greater value than much didactic teaching. It, however, is not possible for most physicians to come in direct contact with a sufficiently large number of gonorrheal patients to make possible a close study of the questions involved. For this reason it has been thought wise to append a number of case-histories to better portray the clinical aspects of the disease. As the writer for some years has inquired closely into the histories of those pa-

tients who visited him in the later stages of the disease, and has made notes upon the therapeutic procedures that had been carried out, as well as the patient's conduct, it has been a simple matter to find a number of "human documents," each carrying its own message.

The aim has been to select an assortment of cases that not only would accentuate the views that have been expressed, but that likewise would bring out many vagaries of the disease that would serve to put our rules to proof. That one could find so many histories evidencing such gross mistreatment is hardly complimentary to our knowledge. Unfortunately, there is no dearth of them in every community of size, a fact that in itself accentuates the great need for a general improvement in the handling of these unfortunates. Among the cases selected there will be found repetitions, but in this regard the reader is asked to exercise some tolerance, remembering that, in many ways, human beings are repetitions of one another and that gonococci are all pretty much alike.

Such an array of cases does not give us a true composite picture of existing conditions, but an exaggeration. There are thousands of cases that really receive good, gentle treatment at the hands of careful, thoughtful physicians. On the other hand, there are so many that do not that we cannot escape the thought that something is wrong. An analysis of the matter rather forcibly brings out the fact that, generally speaking, there are a number of things wrong, and if one were asked to name some of them, he would be compelled to proceed about as follows:

1. A faulty knowledge regarding the disease and the germ that produces it.

2. An unfortunate lack of uniform ideas regarding the treatment indications.

3. Too ready acceptance of the idea that a chemical has therapeutic value because it kills gonococci.

4. Too little regard for the patient's own part in the cure of the disease.

5. The employment of modes of treatment that render the patient's part in cure impossible.

6. An inability to follow the course of the disease born of a lack of knowledge regarding its course.

7. The common neglect of real diagnostic procedures.

8. The use of diagnostic procedures of a sort, and at a time, that they do great harm to the patient.

9. The lack of real effort to prove that the disease is cured before pronouncing it so.

10. A most unfortunate lack of deep interest in the disease.

There are more faults, far too many of them, so that one need make no apology for dwelling upon such unpleasant topics, for to correct a fault we must know that it exists. But in citing unpleasant things it is not necessary to be unpleasant about them, and it is the sincere hope that the frank discussion of these cases will be viewed as an earnest effort to do good and not, in any sense, to scold. The stating of an unpleasant happening must not be viewed as an accusation of evil intent upon the part of him who had a part in it. One does not drift into unfortunate ways through a sheer intent to do harm. With the noblest of aims one sadly can err, and no aims could be higher than those of the physician. Let us then pass blushingly, but hurriedly, over the fact that so many truly "horrible examples" could be found to carry home our message and view them as stepping-stones to a more attractive plane of therapeutic procedure.

In the consideration of these case-histories the same desire for brevity has been adhered to as has been followed in Part One. There is no point in multiplying words by continually adding data that have no direct bearing upon the given case, for which reason only those points have been included that serve to help us in our understanding of its clinical features. Consequently, it

is to be considered that things not given are either negative or not known.

If it was our experience that just so soon as a patient discovered a urethral discharge he consulted his physician and remained under his care until cured, our problems would be comparatively simple. Such, however, is far from being the case. For one reason or another, no class of patients does more drifting from physician to physician. The result of this is that often we are called upon to study and advise treatment for those who not only have had prolonged infections, but who have had added to the clinical picture conditions not due to their disease alone. Such being the case, there is great need to have not only a good understanding of the disease itself, but a knowledge of the results of the many unfortunate things of treatment and conduct that serve to change the clinical trends of the disease. To this end, great care should be taken to obtain from the patient an accurate recital of the events preceding his first visit.

In taking such a history there is not always the greater wisdom in relying too implicitly upon the patient's own story. Perfect frankness upon his part is a rare quality, and the lack of it, at times, leads him to place upon the shoulders of his former physician many things that his own should bear. Such an attitude upon his part usually can be overcome by careful, kindly questioning. Fortunately, the simple diagnostic means at our disposal put us in the position of having to rely but little upon his story in determining existing pathology. The greater value of his narrative has to do with our prognosis and the planning of the most appropriate mode of treatment for his disease.

The laying down of inflexible rules of procedure in our studies is, owing to the great need for individualization, almost impossible. At the same time there is no such wide range of diagnostic procedures needed that they are beyond easy acquisition, but before they are used their possibilities for harm in the given case

should be considered very carefully. The temptation to do too much at the first visit should be strongly resisted. A patient rarely will return to a physician who upon his first contact stirs quiescence into great activity, unless he has been wise enough to prepare the patient's mind for such an occurrence.

In our free discussion of the appended cases much stress has been laid upon the harmful effects of the many things that do so much to turn the course of gonorrhea into paths of danger. Regarding the methods of treatment advocated, it will be remarked by some that many forms that have found favor have not even received mention, and that, as an instrument for common use, the urethroscope almost has been maligned. As to the first, it need only be cited that this is not an encyclopedia wherein must be mentioned every thought from every age. The last has been discussed fully in Part One.

Objection further might be made regarding the inclusion of some cases that, in their findings, seem so alien to gonorrhea itself. The fear is not that we can know too much, nor that we can use what we know to too great an advantage. Aiming at a safer and broader understanding of our most poorly treated disease, there is no crying need for too close a restriction of the field. In every community of size there are hosts of patients still bearing the diagnosis of chronic gonorrhea who never really had gonorrhea, or whose last attack was at so remote a period that the gonococcus long since has disappeared from the field. They alone urge the wisdom of including a number of cases that, though not truly gonorrheal, so commonly are confused with that disease.

Case 1

Four and a half years of useless urethral treatments in the endeavor to clear up a urethral discharge due alone to treatments.

History.—During the very early stages of a supposed gonorrheal infection, six years before, sounds had been passed and highly irritating injections had been given. This attack seemed not to have been cured as the discharge had continued. For the last four and a half years he had used anterior urethral injections of protargol and potassium permanganate. During this time he had been given many endoscopic treatments to the anterior urethra, and sounds had been passed from time to time. The prostate gland had been massaged only three times.

Examination.—A study of the urethral discharge, which was still present, showed it to be composed entirely of mucus and squamous epithelial cells. No gonococci were to be found. The first glass of urine contained a few small epithelial flakes and a slight nebula of mucus. The prostatic and seminal fluids were normal, and a No. 27 sound passed freely to the bladder.

Discussion.—A discharge composed of mucus and squamous epithelium practically always means over-treatment or stricture. Beyond a doubt the continued discharge was due to the treatment alone, as there was no stricture present. As a matter of fact, there is strong reason to believe that he really did not have gonorrhea to begin with. The employment of such frank trauma in the early weeks of gonorrhea surely would have produced a posterior infection, with its concomitant prostatitis. The latter would have retained an inflammation due to secondary bacterial invaders. It would not have cleared up without treatment, and certainly three

massages could not have cured it. Consequently, such a case points almost incontrovertibly to the original existence of a non-specific urethritis and not to gonorrhea.

Treatment.—The findings and the history of long-continued insults to the urethral mucous membrane cry loudly for inactivity. Usually such a case will clear up rather quickly when all treatments are discontinued. It, however, is not altogether rare for such a urethra to shed off large numbers of squamous cells from time to time for some months, perhaps years. So marked is this desquamation at times that it not only causes a slight discharge at the meatus, but very definitely soils the first glass of urine. Unless the microscope is resorted to at these times, the patient is very likely to be started upon another more or less prolonged course of useless urethral treatments.

Case 2

Former gonorrheal infection which had evidently ceased to be, but had been followed by a prostatic infection that almost had been cured. Marriage without infection of wife, despite statement that gonococci were present. Subsequent discharge due to overtreatment.

History.—In 1909 he had had a gonorrheal infection lasting six months, for which he had received no prostatic attention. In 1914 he had married and had not infected his wife, nor had he experienced any symptoms himself until 1925, when he noticed a slight discharge in the morning. He then was informed by a physician that there were gonococci in the discharge, and though his wife had been repeatedly exposed, she had developed no symptoms to suggest that the infection had been transferred to her. He had been told that he had a stricture, though the first sound passed was No. 30 F., and the treatments had continued weekly for some months. There had been given many injections of vaccine, much prostatic massage, and many irrigations. During the

last two years, in addition to his other treatments, he had given himself three urethral injections of mercurochome a day by his doctor's orders. For months he had had no sexual intercourse with his wife for fear he might transmit his disease to her.

Examination.—There was a good-sized drop of pus from the meatus, composed of countless epithelial cells, a few pus cells, and a large assortment of bacteria, none of which were gonococci. The prostatic secretion contained a few scattered pus cells and several very small clumps of pus. The first glass of urine was very slightly hazy, and the second was clear. There was no evidence whatever of urethral stricture. The posterior urethra and bladder were normal, while the anterior urethra showed a pale, almost devitalized mucosa throughout its extent.

Discussion.—The history points only in one direction, a non-gonorrheal prostatitis probably as a heritage of his gonorrhea in 1909. A morning drop of pus in a man leading an active sexual life, whose wife acquires no disease from him, probably is not gonorrhea. It is contrary to most of our experiences with the disease. The disease does not lie dormant in the male for sixteen years, the last eleven of which were spent in marital activities. The statement of the physician that gonococci were present in 1925 is open to more than serious question. If the gonococcus was present in 1925, the treatment received probably would have kept it there until 1927, and it was not then present. One who had used injections for so long a period would have a urethral discharge in 1927 from that alone, and such a discharge would, in all likelihood, be composed largely of mucus and epithelium.

Treatment.—The urethra had earned a much-needed rest, so that the indication was to cease treatment for several months and then carry out prostatic massage for the residual prostatic infection.

Case 3

High-pressure irrigations followed at once by posterior infection, pronounced cured in one month, epididymitis two days later following sexual excitement, gonococci still present.

History.—Six weeks before the present study he had developed gonorrhea. He had visited a urologist on the first day of his discharge, and had his bladder washed out by the use of a large piston syringe. On the third day he had marked frequency and urgency of urination. During this period of acute posterior urethral infection his bladder washings had been continued. Gradually the discharge had subsided, and at the end of four weeks the urine had become clear. Though the patient still complained of some urethral soreness, his physician had said it was of no moment, pronounced him cured and fit to resume his former sexual relations.

On the second evening thereafter the patient had subjected himself to prolonged sexual excitement with a very full bladder, and on the following day had developed an acute epididymal infection.

Examination.—When seen one week after the beginning of his epididymitis the structures were greatly swollen and decidedly painful and tender. There was no urethral discharge, and only a few shreds in his first glass of urine. A week later there was a moderate amount of discharge containing many gonococci and the first glass of urine was cloudy and the second was clear.

Discussion.—Beyond any doubt, his early posterior involvement was due to the fact that he was given intravesical injections when only his anterior urethra was infected. The speed with which his urine cleared up spoke for a high degree of immunity response. To have pronounced such a patient cured at the end of four weeks was to invite disaster. The prostate could not possibly rid itself of gonococci so quickly with or without treatment, and this prostate had received none.

It was fortunate for all concerned that he had limited his activities merely to sexual excitement, or the disaster would have been far greater.

The absence of the urethral discharge, and the almost clear urine during the acute stage of epididymitis, is, as we have seen, a common occurrence. The return of discharge as the epididymal swelling subsided is likewise the usual course of events.

Treatment.—No local treatments were carried out for ten days. After this, low-pressure intravesical irrigations on alternate days soon established a degree of local tolerance wherein the most gentle prostatic strokings were possible. As is usual following an attack of acute epididymitis, the condition cleared up rather promptly without further complications.

Case 4

Early traumatic treatments producing chronicity of infection; freedom from symptoms while on balsamics, and recurrence when they were discontinued; further traumatic treatment, resulting in bilateral epididymitis, chronic seminal vesiculitis, and probable permanent sterility.

History.—For the preceding two years there had been a constantly recurring urethral discharge. During much of this time the treatment had been of a decidedly strenuous sort. There had been sounds and high-pressure irrigations used during the first two months. As these had made him worse instead of better, all local treatment had been stopped, and he had been placed upon oral medication by balsamics alone. Almost immediately there had been marked improvement. There was no longer any discharge. After some weeks of this he had stopped his medicine for several days and the discharge had returned, only to subside again when he resumed taking his balsamics. This experience had been repeated upon a number of occasions, until he had be-

come so discouraged at the end of eight months that he had changed physicians.

The new medical attendant apparently had gone after his residual foci quite energetically, for within two weeks the patient was in bed with bilateral epididymitis. This experience had ushered in a period of greater respect for the disease, wherein the traumatic qualities of the treatment had not been so much in evidence. Under the influence of potassium permanganate irrigations the discharge had disappeared, and the urine had become clear. But it had not stayed so, for each time the doctor had made any digital pressure on the prostate and seminal vesicles there had been a recurrence of his discharge. The same thing had occurred following each nocturnal emission. Consequently, the treatment for the few months prior to the present study had been narrowed down to irrigations and oral medication.

The patient insisted that at no time during these experiences had he had coitus, encouraged sexual excitement, or consumed any alcoholic drinks.

Examination.—The urethral discharge was profuse, and contained gonococci, staphylococci, and diphtheroids. The first glass of urine was cloudy and the second was hazy. Both epididymes showed decided induration. The prostate gland was large and irregular, and the left seminal vesicle was large and indurated. Because he was seen during one of his recrudescences of symptoms, no effort was made to obtain his prostatic or seminal fluids. As a matter of fact, it was not necessary to do so, as the history alone proved they were infected.

Discussion.—A number of points of great interest are brought out by the experiences of this patient. First we see the influence of early trauma in the production of chronicity. Next we see a discharge stopped by oral administration of the balsamics, only to return each time they were discontinued. Such a thing is by no means so infrequent as would be supposed, and accentuates

the thought that in their supposed good there often lurks a far greater evil. The periods of latency and freedom from symptoms that they at times produce are far too often fraught with sessions of sexual looseness wherein the disease is transferred to others.

We later see that, though the disease could be rendered quiescent so easily, it could not be subjected to rough treatment. Within two weeks the change in physicians had been productive of pathology from which the patient was never fully to recover. Not only this, but there had been added that perhaps most dreaded of all local disease extensions, chronic gonorrheal seminal vesiculitis.

His probable permanent sterility assumed an added importance from the fact that he was a young Hebrew. Few sadder things can befall such an individual, as it practically destroys any dreams he might have had of a happy married life. It surely condemns him to the criticism of his own people and the sadness of a childless marriage.

Treatment.—Fortunately, one rarely encounters an infection the treatment of which requires more judgment, courage, and gentleness on the part of the physician, nor more confidence and determination on the part of the patient. The journey ahead is sure to be a stormy one, beset with many discouragements for both. It, therefore, should start with a perfect understanding between them, so that the patient does not, in his discouragements, criticise the physician for every seemingly untoward event.

Standing out as of paramount importance is the chronic gonococcal infection of his left seminal vesicle. So long as it remains infected, it will act as a feeder to more distal mucous structures and continue their infection. On the other hand, just as soon as its infection is cured the more distal infection soon can be conquered. Consequently we have for consideration two possible methods of treatment: (*a*) surgical removal of the vesicle; (*b*) the

slower way of local treatment by vesicular stripping by the finger in the rectum. Surgical removal is, of course, more immediate and dramatic if it is properly done. The operation is not nearly so simple as it would seem to be. Most of such efforts stop with a seminal vesiculotomy, wherein the sac is incised and drained through the perineum for a few days. Cure is by no means the invariable result. Also in this particular case the question of sterility looms. One cannot tell until long after such a patient is cured that he is surely sterile, for which reason surgery may unknowingly obliterate his only hope for a happy married life.

All things considered, and not the least the decidedly disappointing results of many of the surgical procedures on the seminal vesicles, it is the course of wisdom to make a prolonged effort to effect a cure without surgical intervention. Surgery in such conditions should be reserved for those cases in which it has been proved beyond doubt that no other procedures will produce a cure.

Turning our minds then to non-surgical treatment of such a patient, let us consider a few of the most important basic points of such an infection. It has been said that a gonorrheal mucous tract that is permanently closed off eventually will accomplish its own sterilization; that persistence of infection over long periods of time is dependent upon the ability of the structure to empty from time to time. Our history shows us that this infected seminal vesicle was able to empty its purulent products from time to time, for following each nocturnal emission there was a marked increase in objective symptoms. Further, it has been shown that gonorrheal infection rarely will remain for long periods of time where drainage is good. Wherefore, it is obvious that our hope of cure of the vesicular infection rests in the establishment of better drainage, in so timing our vesicular strippings that we do not allow the storage of gonococcal products for too long periods. The patient should

be told that the discharge will be much greater during the first few weeks of treatment, and then gradually will subside. If the digital stripping of the vesicle is sufficiently gentle, it can be done three times a week at first. The massaging finger should be on the alert, however, for any change in the vesicle to suggest acute inflammation, and if such arises, the treatment should be stopped and heat applied.

The object of such frequent strippings at first is to empty the vesicle before there has been too great a disintegration of its contents. In other words, before the autolysis of the contained gonococci and the liberation of all of their gonotoxin. The greater the amount of gonotoxin forced into the urethra, the greater will be its purulent response. The more often and the more prolonged the period of its being subjected to such influences, the more will its own immunity efforts be put in abeyance, and the longer will it take the urethra to recover after its "feeder" has been cured.

These treatments should include the gentle massage of the prostate also, and should be preceded by a permanganate irrigation. With such frequent treatments one must be more gentle than usual lest he occasion an acute inflammation, as is so commonly done by frequent treatments of this type. So soon as the urethral discharge shows a definite reduction in amount, it is wise to increase the interval between treatments so that they are carried out only twice a week. They should be continued for three, possibly four, months. If at the end of that time there is still pus in the prostatic secretion, the patient should be rested from treatment for six weeks, after which it should be carried out as before. If the treatment has been carried out with sufficient gentleness and judgment, and the patient's conduct has been what it should be, it generally will be found that gonococci have disappeared within the first two months of such treatments.

Case 5

Great trauma during early stages of the disease, epididymitis, chronic, painful interstitial prostatitis, prolonged semi-invalidism, intolerance to any but gentlest prostatic treatments.

History.—The patient, himself a physician, had developed gonorrhea in November, 1925. The discharge by the end of the second week had subsided to a morning drop. The anterior urethra then had been dilated fully with a Kollmann dilator, which had caused a great increase of discharge and marked edema of the meatus. This had subsided, and the urethra again had been dilated, with a like result. Shortly after this he had developed symptoms of posterior involvement, whereupon his urologist immediately had started intravesical irrigations with a large piston syringe and prostatic massage. Within a few days the left epididymis had become enormously swollen and the patient was confined to bed. Three weeks later these treatments had been resumed, with the result that the epididymitis, which had greatly subsided, had become worse than ever.

At this time he had visited another urologist, who, knowing the value of gentleness, had placed him upon a rest period of some weeks. He then had started upon very gentle prostatic massage, but the gland was so extremely sensitive this had to be discontinued. Even the gentlest prostatic stroking would be followed by the most excruciating perineal pain radiating into the testicle. Diathermy then had been tried, but gave no relief. Intravenous injections of typhoid vaccine were given and likewise made no improvement. A vasotomy with the injection of acriflavine had been done, and that the tract was patulous was shown by the appearance of acriflavine in the urine. This had caused an epididymal recurrence of a mild nature, but the procedure had been repeated a few weeks later. At no time had nocturnal emissions caused any recurrence of discharge.

Examination.—When examined, thirteen months after the onset

of his disease, the patient had no urethral discharge and his urine contained but a few shreds. The prostate gland was slightly irregular and extremely sensitive. Even gentle pressure upon it caused a number of drops of pus to come from the urethral meatus. The seminal vesicles were not palpable. The area of the left Cowper's gland was thicker than on the right, and decidedly more tender. The prostatic secretion, while 100 per cent. pus, failed to reveal anything resembling the gonococcus on a number of studies, but many staphylococci were always present. None of the studies caused any appearance of urethral discharge.

Discussion.—A perusal of the history leaves no doubt regarding the cause of the present trouble. Gonorrhea cannot be thus treated without the production of great pathology. Obviously the patient was able to overcome his gonococci, despite the atrocious nature of the treatment, as nothing in the later months caused a urethral discharge. Had the gonococcal infection persisted such would not have been the history. To accentuate this further was the continued absence of that bacterium from any of the obtainable secretions.

It was shown by the vasotomies that the ejaculatory duct was patulous, and the absence of any urethral discharge following his rather frequent nocturnal emissions spoke loudly against gonorrheal seminal vesiculitis.

Beyond a question, the patient had a permanently damaged prostate, honeycombed with countless infected cavities. While some of these drained, it is apparent that there were many that drained poorly, if at all. Also, there was grave suspicion of infection in the left Cowper's gland.

Treatment.—From a therapeutic standpoint there are two possible lines of attack, the first, dramatic, and of doubtful results; the second, long continued, but probably eventually successful.

One is almost tempted to urge surgery, but such a prostate cannot be enucleated. If removed at all it must be scooped from

its capsule with a curet, and one rather shudders at the possible final outcome. Also the patient is a very high type Jew, who hopes some day to marry and father some of his own children.

The other plan of treatment is the gentle, persistent stroking of the gland, with the conviction that sooner or later all of the points of prostatic suppuration eventually will break into other and better draining cavities, and thus cease to be a source of annoyance and pain. This seems gradually to be taking place, for the condition and the patient are both slowly improving under it. The gland, however, has never developed a degree of tolerance that will allow of more than the gentlest stroking. Greater pressure causes perineal pain for days, and at times confines him to bed.

Case 6

Gonorrhea subjected to great therapeutic trauma, pronounced cured with discharge still present, subsequent recrudescence with acute epididymitis, marked pathology, chronicity of infection.

History.—Eight months before he had developed gonorrheal urethritis, and the record of his treatment would suggest that the prominent urologist who administered it believed that he should be punished for daring to acquire an extramarital infection. To begin with, a catheter had been passed into his bladder and that viscus washed with acriflavine, after which the catheter was slowly withdrawn and the solution allowed to wash out the urethra. Following each such treatment the prostate had been massaged. These treatments had been carried out every other day for the first three months, with no pause during his severe and prolonged acute posterior symptoms. After this had been discontinued sounds had been passed twice a week for three months, at the end of which time the patient had been told he could indulge in coitus, despite the fact that he had never been free from discharge since he was first treated. Youth and confidence in his physician had led him to try the experiment, with the result that upon the follow-

ing day he had more discharge than ever and a painfully swollen left epididymis.

Examination.—The profuse urethral discharge, despite the epididymitis, contained myriads of gonococci. The left epididymis was enormously swollen and excruciatingly tender. Both glasses of urine were very cloudy. Gentle palpation revealed that the prostate gland and left vesicle were swollen and extremely sensitive.

Discussion.—To discuss such a series of events is little short of wasting words, so loudly does the history speak for itself. In this age of supposed enlightenment one wonders how such things could be so long after the Spanish Inquisition had become ancient history.

Treatment.—Despite the epididymitis, which ordinarily should have hastened recovery, one could not escape the conviction that cure was a long way off, and only to be attained by the gentlest treatment and much patience. Nothing more encouraging than ultimate cure could be predicted for such a patient. Certainly the time element could not be made attractive. Obviously, other than pressure support to the testicle and rectal heat, nothing should be done, there should be no local treatment for some time to come. When the severity of the local lesions had subsided, the eradication of the residual foci of infection could be approached as previously has been described. One naturally would have to feel his way, so to speak, and withhold treatment whenever the previous efforts had occasioned any untoward response. At no time should the effort to maintain the patient's co-operation be forgotten.

Case 7

Passage of sounds during acute infection, great induration of corpus spongiosum, and marked chronicity.

History.—Three and a half months before the patient had acquired an attack of gonorrhea. During his incubation period he had had much alcohol and had indulged freely in sexual pursuits. Shortly after the appearance of his discharge, which was

very profuse, there had been much preputial and meatal edema. During the first week of his disease he had received nothing but oral medication. From the beginning of the second week a sound had been passed into the bladder each day for a month. After this he had had a short course of irrigations with permanganate of potash. As this had brought about no improvement, a zinc sulphate injection had been substituted and used for some weeks. For the three weeks prior to the present study he had been using an injection of 1 per cent. mercurochrome.

Examination.—The patient was a poorly nourished man of a decidedly blond type. He presented a scanty urethral discharge, containing many pus and epithelial cells and gonococci. The entire corpus spongiosum was firmer than it should have been, and there were areas of decided induration along it. The prostatic secretion was 100 per cent. pus, with enormous clumps of pus cells. The prostate gland was large, harder than normal, and quite tender. The first glass of urine contained large shreds, and the second was clear.

Discussion.—The outstanding features of his case are, of course, the traumatic nature of the treatment efforts and the pathology that they had produced. Such measures cannot be productive of improvement and certainly cannot produce cure. The fact that he was a decided blond certainly would not add to his expectations for a prompt establishment of antibody efforts.

Treatment.—Given a patient of the type and presenting the treatment history of this one, it is to be expected that even the slightest improvement in condition would be gained at the expense of much gentleness, time, and good hygiene. No glowing picture of his immediate future can be painted. Attention should be given to his subnormal physical condition. Other than this the treatment presents no difficult problem, for, providing it is lacking in traumatic influences, is aimed at the production of proper drainage and gentle mucosal stimulation, the time eventually will

come when his defensive processes will lead to cure. It is probable that no amount of postgonorrheal dilatation of the urethra will totally prevent later stricture formation, for which reason such an individual should have his urethral caliber investigated at intervals for some years.

Case 8

Instillations with Keyes-Ultzmann syringe in the early stage of gonorrhea, immediate posterior involvement, later bulbar abscess, bad personal conduct, and chronicity of infection.

History.—In February there had developed an acute gonorrhea, for which he had immediately visited his physician. He at once had been given instillations of some medicament into the posterior urethra by means of a Keyes-Ultzmann syringe. After his first treatment he had developed a posterior infection, and after the third an acute bilateral epididymitis. A week later he had developed a large abscess of the bulbar portion of the urethra, which ruptured externally. This had slowly healed without the formation of a urethroperineal fistula.

There had been a recurrent inflammation of one epididymis during that summer, and again in the November of the same year.

During all of this time there had been much treatment of a decidedly traumatic type and the patient's conduct had been far from ideal.

Examination.—When seen two weeks after the onset of his third attack of epididymitis the right epididymis was quite swollen and tender. There was a scanty urethral discharge containing gonococci, and the first glass of urine was hazy, while the second was clear. There was still a mass of inflammatory tissue in the bulb. The prostate was large and tender, but the vesicles could not be felt.

Discussion.—A better example of the dangers of passing instruments into the acutely inflamed gonorrheal urethra hardly could

be found. Little question could arise regarding the fact that the early posterior and epididymal involvements were directly caused by the therapeutic measures adopted. Bulbar abscess, except as the result of tight urethral stricture, is so rare in acute gonorrhea that it, too, was unquestionably occasioned by injury to the floor of the urethra by the syringe tip.

The chronicity of infection probably arose originally from the trauma to the structures, though there were matters of hygiene that could have shared greatly as causal influences.

Treatment.—One should not expect such a case to proceed to quick cure. An interval of rest from all local treatment should be allowed until the epididymis was no longer acutely inflamed. By the careful use of intravesical irrigations followed when safe by gentle stripping of the seminal vesicles and prostate gland, such a patient eventually should go on to cure. Though the vesicles were not palpable, the epididymal recurrences would suggest infection of the seminal vesicles, and they should not be overlooked as a possible place of gonococcal colonization. The patient's conduct should be carefully regulated, and he should be apprised of the possibility of further epididymal inflammations as the result of one's efforts toward cure.

When it was felt that the gonococcus no longer was present, and the patient was almost cured, the urethra should be fully dilated upon a number of occasions as a prophylactic measure against stricture formation at the site of his former perineal abscess. The caliber of such a urethra should be watched for years.

Case 9

Trauma to urethra by means of "mopping"; marked pathology with its resultant chronicity of infection.

History.—Seven months before the patient had contracted gonorrhea. During the first three weeks he had been prescribed urethral injections of potassium permanganate. He then had

changed physicians, and had been given intravesical irrigations and three injections of vaccine a week for three weeks. Again he had changed physicians because he had gotten steadily worse. The physician immediately had passed an endoscope and swabbed out the urethra with mercurochrome. After the second treatment the patient had developed acute epididymitis, but the urethral treatments had been continued for six weeks. He then had been allowed a two-weeks' rest, after which the urethral swabbing had been resumed without the use of the endoscope. With cotton on a wooden applicator, the physician had made his applications of mercurochrome by using the applicator like a ramrod, passing it a number of times the full length of the anterior urethra at each treatment. These treatments had been given twice a week for many weeks. Each had been followed by great burning on urination, meatal swelling, and some blood.

Examination.—At the end of this time the patient presented a profuse gonorrheal discharge, marked induration all along the corpus spongiosum, great meatal edema, and two very cloudy glasses of urine. There was great pain on urination, a very small stream, and he suffered greatly from painful erections with marked chordee.

Discussion.—One hesitates freely to discuss such monumental barbarity. A disease, requiring for its proper care such a high degree of gentleness, could not recover under such treatment. Not only could it not improve, but there would be added to it, by the treatment alone, prolonged chronicity, followed by pathology that would continue throughout the life of the patient. It is really hard to believe that such things could occur in the present state of medical knowledge.

Treatment.—In approaching the treatment of such a case the time element had best be forgotten. The prime indication, in so far as any local attack is concerned, is masterly inactivity. Local heat and attention to the general health should be the extreme

of attention for several days. In such a case experiments with vaccines should be shunned. So much had been done to impair local nutritive functions that any extra stain, such as a local vaccine reaction, easily could result in sloughing of structure.

Gradually the urethral swelling should subside to a state where the gentlest irrigation should cause its more rapid subsidence, and establish a degree of tolerance that would allow of proper treatment to the prostatic and, possibly, the seminal vesicular pathology. Toward the end of such a case it never should be forgotten that the extreme urethral trauma was sure to be followed by multiple strictures. For this reason, after the gonococcus was no longer present, sounds should be passed and the urethral caliber be watched from time to time for years.

Case 10

Prolonged gonococcal infection with almost endless traumatic treatment, large doses of vaccine, bilateral epididymitis and sloughing of one testicle, intention of suit for malpractice, production of great and incurable pathology.

History. Seven years before the patient had contracted a Neisserian infection, for which he had received constant treatment. Injections, irrigations, sounds, and antigonococcic serum repeatedly had been used. After three years his doctor had turned to gonococcic vaccines, and had been unwise enough to boast about how many billions of dead gonococci were being injected into his arm. Each dose had been followed by a marked systemic reaction and an increase in the urethral discharge. Finally, after a number of doses had been given, both "testicles" became enormously swollen and the entire contents of the left side of the scrotum had sloughed out. Even during this event urethral treatments of one type or another had been employed. The remaining epididymis again had experienced an acute recurrent in-

flammation some months later. The urethral discharge had never ceased—it never had a chance to do so.

After eight years had elapsed the patient had become somewhat restive and visited another physician, who, at an unguarded moment, had blamed the loss of the testicle on the vaccine. This lighted the fires of resentment and turned him toward a urologist in the hope of getting his support for a suit for malpractice. It was only by assuring him that, no matter how much justified he might feel his claim to be, the physician easily could prove that the use of vaccines was a recognized form of treatment and thereby render his efforts futile, that he was dissuaded from such a course.

Examination.—As would be expected there was every evidence of traumatic pathology. The urethral discharge failed to show any gonococci after eight years. There was much epithelium and pus, and many intra- and extracellular diphtheroids. The corpus spongiosum felt like a large indurated cord, there were many hard stricture bands, and the ammoniacal urine was voided with much difficulty. The prostate gland was irregular, hard, large, and its secretion consisted of an enormous amount of yellow pus. The vesicles could not be felt, but there had evidently been at some time a marked perivesiculitis, as the intervesicular area was markedly indurated.

Discussion.—Such a history brings out several points of importance. Standing out in high relief is the fact that trauma does not cure gonorrhea. That it had not allowed him to get well is amply shown by the marked local reactions to the injections of gonococcal vaccines. These may cause systemic reactions in the absence of gonorrhea by virtue of their foreign proteins, but they could not cause urethral discharge or an epididymal swelling so severe as to eventuate in gangrene.

The great dangers at times of large doses of gonococcic vaccines is shown, as well as the medicolegal risk entailed, particularly where one boasts of the enormous doses given.

Treatment.—The patient was in search of moral support for a malpractice suit and not treatment. He almost wisely felt that he had had sufficient treatment. No amount of therapeutic endeavor could have restored his lower urogenital structures to anything approaching normal. He should have been given a normal urethral caliber, and some effort should have been made to improve the condition of his prostate. One could not, however, assure him of continued freedom from urethral discharge. Such a discharge probably would continue or recur from time to time throughout life. If one could have passed a cysto-urethroscope into his posterior urethra, the reason for this would have been plain. There would have been many large openings down into his hard, non-collapsing prostatic structure. These never could be obliterated, but, lined with an unhealthy, infected mucosa without resistance, they would pour out their pus year after year. So long as they drained well he possibly would have no systemic symptoms from pyogenic absorption. Their index of draining would be a soiled urine; a clear urine would urge the wisdom of gentle prostatic massage to re-establish drainage. Such patients feel worst when the urine looks best.

Case 11

Posterior irrigations on the first day of the disease, prompt posterior infection and epididymitis, large doses of vaccines, causing recrudescence of epididymal inflammation and entire obliteration of curative responses.

History.—Five weeks before he had developed gonorrheal urethritis. He immediately had visited a urologist, who started anteroposterior irrigations under great hydrostatic pressure. By the third day he had developed symptoms of posterior urethral involvement. Despite the presence of marked vesical discomfort, and a cloudy first and second glass of urine, the high-pressure irrigations had been continued. Two days later the right epi-

didymis became acutely infected. The local treatments then had been discontinued, and large doses of gonococcal vaccines had been given at five-day intervals. The epididymal swelling, which had begun to decrease, had undergone a sudden increase after the fifth injection of vaccine. The temperature had reached 130° F., and there had been excruciating pain. The urologist had insisted upon sending him to the hospital for an epididymotomy, whereupon he had stayed in bed at home for several days and changed physicians.

Examination.—There was a profuse urethral discharge instead of the scanty discharge usually found during active epididymitis. There were countless gonococci, most of which were extracellular. The epididymal swelling was enormous, extremely painful, and tender, but there were no areas of fluctuation. Both glasses of urine were very cloudy. As the treatment indications were plain, there was no call for immediate investigations of the prostate and seminal vesicles other than palpation.

Discussion.—Not only was this patient given high-pressure irrigations from the first day of an acute urethral inflammation, but the fluid was forced into the bladder when there was a profuse gonorrheal discharge from infection of only the anterior portion of the canal. As should be expected, there was almost immediate posterior involvement and, despite this extension, the irrigations were continued, causing epididymal infection. While such extension was giving the patient an ample amount of antigenic absorption, this was further increased by injection of vaccines, until a quantity was reached where the antibody responses were overwhelmed. This brought about a marked epididymal recurrence, with great elevation of temperature.

Treatment.—With so marked an epididymitis in a patient whose immunity efforts had been so thoroughly effaced by trauma and injected vaccines, local treatments to other than the epididymis would have been a gross error. Under the best of circumstances

such a patient would be expected to improve slowly in so far as his deeper infection was concerned. A pressure bandage to the epididymis until it subsided was the immediate call. Later, when the vesical condition had subsided, one could begin irrigations of the bladder under low pressure. Such a case would improve slowly at best, and excuses should be found to delay the local attack rather than to hasten too precipitously into the use of things that might cause a recrudescence of the symptoms and further obtund the tissue responses. With the utmost gentleness such a patient usually can be carried on to slow but uneventful recovery by the plan of treatment hitherto outlined, providing he sedulously avoids alcohol and sexual excitement.

Case 12

Repeated reinfections from the same individual, but probably not by the same "strain" of gonococci, much ill-advised treatment, large doses of vaccine, with entire obliteration of curative efforts on the part of the patient.

History.—Three years before he had received his initial gonococcal infection and during this time had had many recurrences. During the entire interval he had been under a physician's care, and much of his treatment had been of a highly traumatic nature. The evidences of the disease would gradually subside, almost disappear, and then a few months later suddenly flare up. There had been much intra-urethral instrumentation with sounds and dilators, at times during the presence of a copious urethral discharge. While there had been repeated attacks of vesical discomfort there had been no epididymal extensions. His case was considered to be one of chronic gonorrhea in an individual with poor resistance, and as such he was referred to other hands after almost every plan of treatment suggested by any text-book had been tried. During this last period of activity he had received many large

doses of gonococcic vaccines, and the discharge had continued longer than at any of his previous experiences with it.

Examination.—There was a profuse urethral discharge containing many gonococci. Both glasses of urine were cloudy. The duration of the disease and the cloudy second glass of urine were sufficient to make the diagnosis of gonorrheal prostatitis without carrying out further diagnostic procedures during this period of marked recrudescence of symptoms.

Discussion.—It obviously is possible for such an infection subjected to so many traumatic onslaughts to continue for three years, but an analysis of the history gave the impression that there was more to be learned from the patient. It was in evidence that during those times that the disease markedly subsided very little traumatic treatment was carried out, and if sounds were passed or the prostate massaged at such times the disease was not rendered worse. Such being the case, one naturally would be led to suspect the patient's conduct rather than his resistance. After much questioning he reluctantly gave the key to the entire situation. He behaved himself until the infection subsided to a point where he had only a moisture at the meatus in the morning. He then would have regular intercourse, always with the same woman, using a condom. When a condom broke, as they seemed repeatedly to do, he knew that three days later he would have a discharge and was seldom disappointed. Not vouchsafing this information to his physician, it was a simple matter to create the impression that it was all one attack of gonorrhea. The unusual feature of the case was that each attack compared well with its predecessor as regards severity. Such is seldom the case where the infection is repeatedly contracted from the same source. It, of course, is possible, in fact, probable, that, though from the same woman, he was not reinfected by the same "strain," for he knew that the woman had many friends of undoubted intimacy. Such was her sole occupation.

Treatment.—Despite the marked cloudiness of both glasses of urine, the freedom from any symptoms suggesting vesical intolerance, and the length of time during which he had remained the same, one felt no hesitancy about the immediate institution of gentle intravesical irrigations. It is not the experience that such a patient, whose profuse discharge was undoubtedly more due to his vaccine than his disease, per se, has to be treated with the extreme caution that one must observe where the two cloudy glasses of urine are due to an acute, fulminant, posterior infection. As a matter of fact, such a patient often will remain stationary for weeks unless such irrigations are carried out. Nor is it necessary in such a case to wait until the urinary picture has cleared entirely before treatments are applied to the prostate gland, providing such treatments are of the gentlest sort, for these patients do not so readily develop further complications as do the newer posterior urethral involvements.

In such a case one can predict eventual complete cure, but he should not allow himself to boast of probable quick cure. If such a patient is entirely well in six months, his physician has no reason to feel that he should turn to other fields of endeavor.

Case 13

Gonorrhea, erroneous diagnosis of spasmodic stricture, catheter given the patient to use, severe acute prostatitis subsiding without abscess formation, large doses of vaccine, and great produced pathology.

History.—The patient, a traveling man, had contracted gonorrhea three months before. He had been placed upon urethral injections, which seemed to increase his urethral discharge and irritation, as well as to produce much swelling, which naturally would cause a small urinary stream. Because of this small stream a diagnosis of "spasmodic stricture" had been made and a catheter passed. This had been followed by an attack of acute urinary

retention, which had to be relieved by catheterization. The patient had been given a catheter and told to use it whenever necessary. Within a few days there had developed great pain and fulness in the prostatic region. After this had subsided without abscess formation he had received five injections of gonococcic vaccines, each followed by a marked local and systemic reaction.

Prior to the use of vaccine he had started to improve, but since its use he had been worse and showed no signs of improvement.

Examination.—There was a moderate amount of urethral pus, showing countless extracellular gonococci. The first and second glasses of urine were very cloudy. The area of the prostate and vesicles was the seat of a large inflammatory plaque of tissue that made it impossible to differentiate these structures by palpation. There was likewise much inflammatory induration along the entire course of the corpus spongiosum.

Discussion.—The treatment used in this case was of such a nature that it unquestionably would obliterate any effective curative efforts on the patient's part. After such a history no type of treatment known today would secure a quick improvement in the disease. With so much direct trauma to the urethra there would be produced marked pathology, which of itself surely would cause a prolonged infection.

It is of interest to note the extracellular location of the gonococci. As a rule, one can say that the greater the duration of the infection, the higher will be the phagocytic index, but here we see the reverse—practically no phagocytosis.

Treatment.—The treatment of similar cases has been outlined so often that it hardly seems necessary to allude to it. Irrigations with later gentle prostatic massage and, when it is felt the disease is cured, attention to the urethral induration are at present our only good means of producing cure in such patients. If carried out with sufficient care over a sufficiently long period of time, there should be no doubt regarding the eventual disap-

pearance of the gonococcus. To clear up the residual pathology that was not really a part of the disease, per se, would require many months. Before such a patient was dismissed there should be carried out urethral dilatation, and the caliber of such an urethra should be watched for years.

Case 14

Many attacks of gonorrhea, great trauma, large doses of vaccines, marriage, subsequent gonorrhea on a number of occasions, total prostatectomy and seminal vesiculectomy advised by surgeon, new attack of anterior urethritis during course of treatment.

History.—Over a number of years prior to 1916 he had had so many attacks of supposed gonorrhea that he had lost count of them. For these he had received many varieties of treatment accompanied with much urethral trauma. In addition to this he had received a number of courses of vaccines in large doses.

In 1916 he had married, but his wife had never experienced any urogenital symptoms to suggest gonococcal infection. Such continued to be the case with her, despite the fact that he had experienced attacks of gonorrhea in 1918, 1920, 1923, and again in 1926. For this last attack (March, 1926) he had been given prostatic massage daily for several weeks until he developed a prostatic abscess that ruptured into the urethra.

Following this there had been given treatments which included the passage of sounds, prostatic massage, irrigations, and gonococcal vaccines. In January, 1927, a month before the present study, he had visited an urologist, and had been informed that his only hope of cure rested in complete surgical removal of the prostate gland and seminal vesicles. To this he naturally and wisely had refused to submit himself.

Early in 1926 he had experienced several profuse recurrences of urethral discharge following nocturnal emissions, but such had not been the case during the six months preceding his study.

Examination.—In February, 1927 there was a very scanty urethral discharge, which presented the common urethral bacteria but no gonococci. The prostate and seminal vesicles could not be mapped out by palpation, as the entire area was composed of a large, tender, brawny mass of inflammatory tissue which extended further up on the bladder wall than the finger could reach. By very gentle stroking of this mass it was possible to express a large amount of prostatic and seminal fluids containing great quantities of free and clumped pus cells. There could be no doubt regarding the presence of infection in one or both seminal vesicles, as large clumps of pus cells were entirely enveloped by the vesicular gel. By careful search upon a number of occasions it was not possible to find any bacteria that could be even remotely mistaken for gonococci. The first glass of urine contained many large slugs of pus, and the second was clear.

A cystourethroscopic study later revealed a normal bladder with some slight edema at the vesical outlet. The posterior urethra, however, was the seat of marked pathology. There were many large prostatic openings from which pus could be seen to exude. The lateral prostatic lobes showed considerable bulging toward the urethral lumen, and the mucosa covering them was studded with many small pustular excrescences. The mucous membrane of the anterior urethra was pale and showed many stricture bands of large caliber.

Discussion.—It is seldom that one encounters a case presenting so many interesting and instructive features. From the standpoint of produced pathology it speaks volumes, and it is equally eloquent from a viewpoint of the natural history of the disease itself.

From an immunological aspect we can perhaps pass rather quickly over his prenuptial history. It is of interest mainly because of the great assortment of the treatments given, together with the trauma of them. The more closely one inquires into this

period, with its numerous reductions in antibody formation as the result of many large doses of vaccine, together with much sexual looseness, the more strongly is he inclined to feel that many of the so-called new infections were, in reality, recrudescences of older uncured infections. Be this as it may, the general result must have been the production of prolonged periods, wherein no effective curative efforts whatever could be marshaled by the local structures. The possible harboring for such long periods of the same "strain" of gonococci would tend to produce long intervals of latency of symptoms wherein the anterior urethral mucosa would respond scantily, if at all, to the irritating influences of gonotoxins. In fact, if we are to believe his statement regarding the absence of extramarital exposure, we are forced to the conclusion that he had such an infection when he married in 1916, and that his developed "strain-toxin-desensitization" continued until 1918. Such a long refractory period is certainly unusual, particularly after the gonococci had been placed upon new soil, from whence they repeatedly could have been reacquired. Certainly there was no chance for his wife to avoid infection as she repeatedly had been exposed to it, and it is of great interest that she at no time had any subjective symptoms suggestive of gonorrhea. The subsequent course of his experiences blend well with those commonly encountered in what we have been pleased to call "marital gonorrhea." For it is common experience to see the disease reappear at two- or three-year intervals under such circumstances.

Passing to his attack in 1926 we find the condition subjected to its crowning therapeutic insult. Shortly after its onset he was given prostatic massage every day for several weeks. Even the chronically infected, non-gonorrheal prostate cannot be given daily massage for so long a period without the production of a marked acute prostatitis. Consequently, it was to be expected that such treatment would bring about just what it did in him, a prostatic

abscess. It also was, in all probability, because of this that he had a marked perivesiculitis eventuating in the large inflammatory plaque of subvesical tissue described.

Treatment.—A month before a total prostatectomy and seminal vesiculectomy had been advised. This was based on the pathology present and not on the symptoms, for these were hardly severe enough to warrant such a major procedure. The discharge had not been greater than an occasional moisture at the meatus, particularly in the morning, and the perineal pain was slight and occurred only after sexual excesses. Further, it is doubtful if such an operation could have been done, as the pathology was so tightly adherent to the bladder that the ureters would have been injured in its removal and have required transplantation.

Assuredly the slower way offered by far the better outlook. The one indication was to promote drainage of the infected areas through their natural channels. It had been demonstrated that at least one, and probably both, seminal ducts were patulous, and if by gentle stripping these could be rendered free from disease, the prostate steadily would improve under the same plan of treatment. In so far as the remains of the perivesiculitis was concerned nature in time would care for that by fibrosis, whether the patient was treated or not. The patient, therefore, was given an irrigation of 1 : 5000 potassium permanganate and a very gentle prostatovesicular stroking twice a week. The result of this was that the first glass of urine soon contained only a few small shreds, the perineal discomfort ceased, and there was no longer any urethral discharge.

After some weeks of this greatly improved condition, and while still under treatment, he returned with a new urethral discharge containing many gonococci. This occurred four days after an isolated intercourse with his wife. The first glass of urine was cloudy and the second was clear. He immediately was placed upon the treatment previously outlined for anterior urethritis, and

the disease subsided so rapidly that within ten days there was no longer any urethral discharge. Shortly after this he drank some liquor, and upon the following day there was a recurrence of discharge containing gonococci. This subsided within a few days and he went on to cure. Before there was reason to feel that cure had really taken place the prostate and vesicles were gently stripped so that their secretion entered the anterior urethra, but no irrigation was given. This failed to cause any return of discharge whatever, showing that there was no posterior infection by the gonococcus. Had such have been the case there surely would have been a return of discharge, as he had shown only a few days before by drinking alcohol that his anterior urethra was highly sensitive to gonotoxin. One hardly could ask better evidence that his later infections had been due to bacteria acquired from his "carrier" wife, and were not true recurrences from gonococci flushed from his own poorly draining mucous channels.

An opportunity was sought to study the bacterial flora of his wife's urogenital tract, but it was not possible to get her sufficiently interested in the matter in the absence of any signs of the disease on her part. Under such circumstances, his outlook regarding freedom from further attacks of the disease are, to say the least, far from good.

Case 15

Early improvement, overwhelming of curative processes by large doses of gonococcal vaccines while in jail, posterior involvement without subjective symptoms.

History.—Ten weeks earlier he had developed gonorrhea, and had been immediately placed upon anterior urethral injections. After ten days of this treatment, during which he had seemed markedly to improve, he had been sent to jail for sixty days for some misdemeanor. While in jail he had had no sexual excite-

ment or alcohol, naturally, and insisted that he did not masturbate or indulge in any form of artificial sexual relief. During this period of enforced rest he had received no local treatment to the urethra, but had been given many large doses of gonococcal vaccines. He had had no vesical irritation suggesting posterior urethral involvement.

Examination.—There was a profuse discharge containing countless gonococci. That there had been a posterior extension of the disease was shown by the fact that his first glass of voided urine was cloudy and the second was definitely hazy.

Discussion.—With the constant trend toward latency, exhibited by gonorrhea in most individuals, this man should have been free from gonococci, or nearly so after sixty days of such ideal hygiene as his incarceration forced upon him. Certainly, under ordinary circumstances, the condition should not have been so active as it was. That it was so could hardly be attributed to the virulence of the micro-organism nor to an innate lack of resistance, for he had shown good improvement until he was given vaccines, after which he became definitely worse and remained so. There was no question in his mind regarding the association of this change with his vaccines. Undoubtedly they had been large doses, as all of them had caused a systemic reaction, amounting to a definite chill on two occasions. Involvement of the posterior urethra without subjective symptoms is by no means an uncommon event.

Treatment.—It would be difficult to find a better illustration of the harmful effects of large doses of gonococcal vaccines. By such a procedure, the immunity efforts of the individual are so thoroughly obtunded that no plan of treatment that we now have will produce prompt cure. Beyond the discouragements of time his condition presents no unusual therapeutic problems. Mild and gently given intravesical irrigations every day or two should eventually lead to a degree of tolerance that would make digital

stroking of the prostate a moderately safe procedure. By gentle, persistent treatment a complete cure eventually should be brought about.

Here we are not dealing with produced deep pathology of traumatic origin, but simply the overwhelming of all of the natural combative processes. As we have no quick, sure way to revive them, the aim is gentle local stimulation until such time as they begin to return.

Case 16

Prolonged incubation period, during which there were no microscopic evidences of disease, intoxication with appearance of gonorrheal discharge.

History.—A few days before his first visit he had been on a week-end party where there had been an abundance of promiscuity, so that, if there was an infection in any of the six members of the party, there was every reason to expect that all would contract it. As a matter of fact, he had come in with a member of the group who had a very florid gonorrheal infection as the result of the same orgy.

Examination.—Repeated careful studies of the expressed urethral secretion upon six consecutive days failed to show either pus or gonococci. On the evening of the sixth day, in order to celebrate his supposed escape, he imbibed to the point of profound intoxication. Upon the following morning there was a moderate amount of urethral discharge showing countless intra- and extracellular gonococci.

Discussion.—Such a high degree of latency at the beginning of the infection is indeed unusual, but the possibility of it shows the value of extreme caution in pronouncing freedom from infection. The value of alcohol in bringing to light such hidden infections can well be borne in mind.

Note.—This case, together with that of a student who devel-

oped his first symptoms of gonorrhea the morning after consuming much alcohol six weeks after his last sex contact, has been mentioned in Part One. Both would suggest that our long incubation periods are more apparent than real.

Case 17

Supposed recurrence of old gonorrhea which was, in reality, a new infection.

History.—Three years before he had had gonorrhea, which had cleared up promptly, but had left a sticking sensation in the urethra when he urinated. A year later he had married a woman much older than himself. There had been no appearance of discharge during the two years of his married life, despite much sexual and alcoholic indulgence, until three days before the taking of this history. He absolutely denied extramarital exposure, and appeared convinced that his present attack, which was frankly gonococcal, must be a recurrence of his former disease.

Examination.—There was a moderate amount of urethral discharge containing many gonococci. The first glass of urine was hazy and the second was clear.

Discussion.—It is not the habit of the gonococcus to lie dormant for the first two years of matrimony and suddenly reappear. Yet here was an apparently honest and respectable individual who disclaimed any other possible source of infection. He told his story and he stuck to it, until some days later his physician spun an imaginary yarn of his own recent sexual transgressions that made him seem more immoral than the patient ever could hope to be. The result was that the patient became both confidential and boastful in telling of a night spent with a hotel maid several days before the onset of this supposed recurrence of an old infection. Nor did he take offense when told that he had been tricked into the confession.

Treatment.—Being in the second day of an acute gonorrheal infection without posterior involvement his treatment was carried out as outlined in our text for such a condition.

Case 18

Improper treatment instituted when cure was almost in sight, posterior urethral lesion causing referred symptoms leading to much useless anterior treatment.

History.—For an attack of gonorrhea four years before he had received three months treatment in a dispensary. The last month of this course of treatment had consisted of prostatic massage and irrigations twice a week. Still having shreds in his urine, he had discontinued treatment at the dispensary and gone to an urologist. For a year the urologist had alternated with sounds and prostatic massage.

Finding his condition unchanged he had then gone to his family physician, who had added to the above treatments vaccines, silver nitrate instillations, and the "blowing of white powder into the penis." After this the patient had used urethral injections and oral medication advised by his druggist. There had been during the last three years a burning sensation in the rectum. The rectal sensation gradually had become less pronounced, but there had been added an itching sensation in the urethra and marked scrotal sweating.

Examination.—There was no urethral discharge, but the first glass of urine contained a few flakes composed of plaques of squamous epithelium. The prostatic secretion contained a few small clumps of pus cells. The bladder was normal except for a large edematous mass in the postmontane fossa. The edges of this mass were shaggy, and probably composed of necrotic shreds of mucous membrane.

Discussion.—During the first three months of his disease his

treatment was good. Just about the time he should have gone on to recovery on two prostatic massages a week he had changed doctors and treatments, so that he had only received one such treatment a week. It requires very little observation to discover that prostatic infections generally do not get well on one massage a week. True, they rarely get worse. They remain stationary and apparently so did his, for it was still present, though mildly, several years later.

Undoubtedly he was free of gonococci at the end of his three months of dispensary treatment as the passage of sounds made no immediate change for the worse. Just what the passage of sounds had to do with the formation of the peculiar postmontane pathology is hard to say, but it evidently started while the sounds were being used. The burning sensation in the rectum is very strong evidence of this. It is not usual for follicular prostatitis alone to cause referred sensations into the rectum or along the anterior urethra. Such symptoms, and this rather safely includes marked scrotal sweating, are usually due to some posterior urethral lesion. As a rule, no amount of treatment by sounds or massage will cause their disappearance. On the other hand, the direct destruction of such an urethral lesion almost immediately will cause the symptoms to disappear, as was the case with this patient.

Turning to his other treatments, they obviously are an assortment of gropings in the dark in the forlorn hope that either they or time the great healer might smile kindly on the efforts. To say the least, they were devitalizing, traumatic, and generally ill-advised.

He needed prostatic massage when the urologist got him, with possibly the passage of a few sounds at the end of his course of two massages a week. After the urologist lost him he needed only the destruction of his urethral lesion, a rest, and a course of massage. Instead of this he received a long series of anterior urethral insults all to no purpose, except to produce mucosal

desquamation with its resultant flakes in the urine, and all of this when the anterior urethra was in nowise at fault.

Treatment.—As has been said, the first indication was to destroy the symptom-producing lesion in the posterior urethra. This was easily done by an application of 50 per cent. silver-nitrate solution through the endoscope. After this there should be allowed a rest of several weeks for complete healing, followed by prostatic massage twice a week until the secretion contained no more pus. In the treatment of such a prostate it is a common experience to find that for the first few weeks the patient appears to be worse, as there is much more pus in the expressed prostatic secretion. Clumped pus in a prostatic secretion is an evidence of poor follicular drainage, and it is natural that there should be more pus during the first few weeks of the better drainage. After this the secretion progressively should improve until cure has taken place.

Regarding the urinary flakes, they were the result of Nature's effort to build up a protective layer of squamous epithelium, so that the mucous membrane might survive the therapeutic onslaughts to the canal. Except in the mind of the patient, they were of no particular importance in the larger picture. They called for urethral rest and not treatment.

Case 19

Crawling sensation in the rectum resulting from granuloma of sinus pocularis and pus pocket.

History.—An attack of gonorrhea eleven years before had been severe, and, though there was a definite history of posterior urethritis, there had been no treatment for the residual prostatitis at that time. Nine years later he had noticed a slight discharge of pus from the meatus in the morning. Shortly thereafter he had developed a sensation in the rectum as though there was a

bug crawling there. He had been given some prostatic massage for this and had had full-sized sounds passed, but had received no benefit from either.

Examination.—The urethral discharge was difficult to obtain, but showed many pus cells and many staphylococci. The prostate, per rectum, was normal, but its secretion showed much clumped pus. The first glass of urine contained shreds.

Cysto-urethroscopy revealed a normal bladder and urethra, except for a granulating protrusion from the sinus pocularis. An effort was made to destroy this with fused silver nitrate on a probe. After slight pressure upon the mass the probe suddenly pushed into a cavity and a gush of creamy pus escaped. This cleared up the rectal sensation almost at once, and it had not returned some days later.

Discussion.—Though such experiences as this are rare, it is by no means uncommon to find verumontanal lesions causing referred sensations in the rectum and to have them clear up at once upon the application of caustic. These symptoms are seldom, if ever, described as pain, as so commonly is the case in the prostatic fibrosis that at times follows long-standing prostatic infections. The most usual points of reference of discomfort or pain from such conditions are along the urethra, in the perineum, or in the rectum.

The occurrence of pain or discomfort along the anterior urethra, particularly in the fossa navicularis or at the penoscrotal angle, has been a fertile source of diagnostic error. Strangely enough, it is extremely rare to find chronic anterior urethral pathology accounting for these symptoms. Almost invariably they are referred from the posterior urethra or prostate. The exceptions occur in those patients with tight urethral stricture with its history of a small stream for many months.

In this patient the scanty urethral discharge was unquestionably due to his chronic prostatic infection.

Treatment.—The subsequent treatment consisted in irrigations and prostatic massage.

Case 20

Strong chemical injected in early stage, persistence of gonococci, stricture formation, and cure of gonorrhea only after dilatation of the strictured urethra.

History.—Four months before this study he had contracted gonorrhea and had infected his wife. He had been given a dilute potassium permanganate solution to use as an anterior injection. His wife had been given a strong permanganate solution, with instructions to put a teaspoonful of it in two quarts of water, and use as a vaginal douche. By mistake the husband had used the strong solution given his wife. There had followed an intense inflammatory reaction along the canal, and for several days he could only empty his bladder drop by drop. These efforts at urination had caused the most agonizing burning pain. This condition gradually had subsided, but the urethral discharge had continued.

Examination.—The urethral discharge showed much squamous epithelium, pus, and many gonococci. The first glass of urine was hazy and contained many shreds while the second glass was clear. The urinary stream was small and twisted. There was no hesitancy felt about making a study of the prostate as the condition had remained stationary for so many weeks, and there was every reason to believe that the posterior structures had become infected. The prostatic secretion was 100 per cent. pus.

The history of almost a caustic urethral injection, together with a decidedly small urinary stream and almost a pipe-stem urethral induration, practically made the diagnosis of urethral stricture without instrumentation.

Discussion.—There was every reason to believe that this pa-

tient made his unfortunate error in treatment before his infection had extended into the posterior urethra. That the entire anterior urethra had been subjected to this strong chemical was shown by the fact that the inflammatory infiltration extended as far back as the bulbomembranous junction. In other words, the entire extent of his gonorrheal mucosa was subjected to the influence of what very probably was a saturated solution of potassium permanganate. Despite this, his infection later spread into the posterior structures and chronically remained in the anterior urethra, all of which accentuates the fact that the gonococcus in the urethra can outlive an onslaught by the strongest germicides.

That the gonococcus remained in the urethra for so long a period is probably to be attributed to poor tissue drainage and mucosal devitalization, due to the pressure from urinary efforts in the presence of his tight stricture.

Treatment.—A decided disinclination to use instruments in a known gonorrheal urethra led to an effort to cure the gonorrhea first, and take care of the urethral narrowing after this had been brought about.

The treatment, therefore, was started by giving intravesical irrigations three times a week. Great care was taken not to bring about sufficient hydrostatic pressure to cause injury to the urethra. After the first week the prostate was gently massaged twice a week. Together, these further reduced the urethral discharge and made a decided improvement in the prostatic secretion. They did not, however, remove the gonococci from the urethra. Consequently, when it was seen that cure probably would not take place until the urethra was dilated, sounds were passed at four-day intervals. The urethra received a copious irrigation before the sounds were passed. At first little change was seen, but when the canal had been dilated beyond No. 26 F. the improvement was rapid, and within a month it was not possible to find any gonococci after the most careful searches for them.

Case 21

Much useless treatment for an infection that did not exist in a patient intelligent enough to know that he at least merited a microscopic study.

History.—March 5, 1927 the patient, while in Cuba, had exposed himself sexually, and forty-eight hours thereafter had noticed a slight urethral irritation. He then had given himself several urethral injections which, though they had caused considerable burning, produced no purulent response.

Returning to this country ten days later he had visited an urologist who, on the strength of his history, but without study, had started him upon a course of urethral irrigations, followed by the passage of sounds. Upon only one occasion had it been possible to strip any secretion from the urethra. This the patient suggested might be examined, but his physician had replied that it was not necessary, as he knew what was in it.

After a month of this treatment prostatic massage had been started. Again the patient had suggested microscopic study of the expressed prostatic secretion, and the physician had given the same answer, adding that he had prostatitis and needed a course of prostatic massage. Being rather too intelligent to accept such ready answers the patient changed physicians.

Examination.—The closest examination failed to reveal any evidence whatever of present or past urogenital pathology.

Discussion.—There seems to have been no reason whatever to suspect that there had been an urethral infection. The early urethral irritation was undoubtedly the type seen in an individual who had developed the great fear that he has become infected, and it shows the rather ready response of urethral sensations to the imagination. The condition is rather common, and needs only the proof that no such infection is present to banish the sensations almost immediately.

That patients are beginning to realize that they at least are

entitled to a microscopic study under such circumstances shows that lay education is reaching a higher plane. The effect of such realization can be nothing but good.

Case 22

Three years of energetic treatment to cure perfectly normal conditions.

History.—Five years earlier the patient had had a urethral discharge, lasting about ten weeks. For this his treatment had been above criticism, and, though there was no history of posterior infection, he had had a short course of prostatic massage.

Two years later, after an exposure, he noticed a slight morning discharge, and stated that a swelling had appeared in his perineum during the act of urination and persisted for some time thereafter. These symptoms had been treated ever since their development. There had been a number of courses of mild urethral injections, and for four or five months he had received two prostatic massages a week. Despite all of this attention, his symptoms persisted and the patient was considerably upset by them.

Examination.—The external genitalia were normal. There was no discharge present. The bladder and urethra were absolutely normal. A smear of the urethral discharge, brought in by the patient, showed it to be composed entirely of normal mucus with no cellular constituents. The prostatic and seminal fluids likewise were normal. A careful study of the perineal "swelling" showed it to be nothing but the normal bulb of the corpus spongiosum. It was there whether he urinated or not, but, as he only looked for it during and after urination, he was not aware of the fact.

Discussion.—It is not an unusual thing to find a patient so thoroughly upset by a former attack of gonorrhea that he enormously magnifies everything he discovers about his urogenital tract thereafter. Were this not the case charlatans would lead a lean existence, for it is from individuals of this type that most of

their money is made. He, fortunately, had not fallen into such hands, but a little careful study upon the part of those who did treat him would have shown the futility of the treatments as they were applied. He, likewise, would have been saved a world of anxiety and much needless expense.

Treatment.—The only treatment required was to show him there was nothing abnormal. His relief when convinced of this was very great, but not sufficiently great to tinge his remarks with charity toward those who had so blindly treated him for the last three years.

Case 23

High-pressure urethral irrigations causing a follicular abscess, external evacuation, subsequent early stricture formation causing continuous urethral discharge.

History.—During an attack of gonorrhea two years before he had been given urethral irrigations at very high pressure and had developed a follicular abscess. This had been opened externally at the penoscrotal junction and had healed without fistula formation. Some time after this he had been given a course of prostatic massage and pronounced cured.

Six months later, following an incubation period of four days, he had acquired the disease again. The course of this attack had been very mild, and there had been no symptoms suggesting posterior infection. By the end of three weeks all discharge had ceased, and there had been no further signs of trouble for several months. He then had noticed that each sexual indulgence or the drinking of alcoholic liquors would occasion a discharge upon the following morning, which would subside within a few days. Later this discharge had become continuous, so that there was always some slight moisture at the meatus. Though this discharge had been studied repeatedly, no gonococci had been found in it.

Examination.—The urethral discharge was mucoid in character, and contained many squamous epithelial cells, a few pus cells, but no gonococci. The first glass of urine contained a few small shreds, and the second was clear. The prostatic secretion was normal. It was noticed that the urinary stream was much smaller than should be expected from such a large urinary meatus as he had. This fact, the preponderance of squamous cells, the history of follicular abscess, and the mucoid character of the discharge suggested the possibility of urethral stricture. The passage of a bulbar sound after urethral irrigation revealed a narrowing at the site of his former abscess that had a caliber of No. 15 F. scale.

Discussion.—There can be little doubt regarding the causal factors of his follicular abscess. One practically never sees these in a patient who has not been subjected to intra-urethral high-pressure, either from treatment efforts or urethral narrowing. Unquestionably there was no traumatic or congenital stricture present before he contracted gonorrhea, as the reduction in the size of his urinary stream had developed during the last year. On the other hand, such early fibrosis is unusual. It usually requires from three to five years or longer for a stricture to manifest itself. Exceptions do occur, however, and upon very rare occasions there is sufficient contraction during the first year to narrow the canal very definitely.

Treatment.—The only treatment indication in such a case is to re-establish the normal lumen of the canal. This was carried out by a preliminary irrigation of the anterior urethra, after which sounds, increasing not more than two sizes at each treatment, were passed every five days. So soon as the urethra was completely dilated the discharge disappeared and did not return after drinking and sexual excitement. Such an area has the power to recontract and should be watched carefully for many years.

Case 24

Early latency and prolonged persistence of anteroposterior gonorrhea, due to the constant use of astringent irrigations and injections.

History.—Immediately following the development of gonorrhea, three months before, he had been placed upon urethral injections of borosalicylate of zinc (Neisser-San-Kahn). After about a month he had discontinued his injections, as he and his physician had considered he was well. A few days later his discharge had returned and symptoms of posterior urethral infection set in. He at once had been given daily intravesical irrigations of the same solution and instructed to give himself an urethral injection four times a day. The intravesical irrigations had been discontinued after two weeks, but the anterior injections had been continued until the present study.

Examination.—A smear of his scanty morning discharge of pus showed no gonococci. His prostatic secretion was practically 100 per cent. pus. He was told to discontinue his injections and return in two days for further study. Upon his return he had a profuse urethral discharge, containing many gonococci, and both his first and second glasses of urine were very cloudy.

Discussion.—We here see an attack of gonorrhea quickly rendered latent by the use of astringents and remaining so as long as the treatments were continued, only to become decidedly active when the use of astringents was stopped. The great activity of the disease just as soon as the effects of the astringent substance wore off is rather unusual. It is the usual custom under such circumstances to have the disease recur in a sluggish way.

Treatment.—The treatment was simply that of anteroposterior gonorrhea with its concomitant prostatic infection. It presented no unusual features, and went slowly on to complete cure without further complications.

Case 25

Mild anterior urethritis treated with astringents that masked the symptoms, asymptomatic involvement of the posterior urethra and prostate, pronounced cured while the prostate harbored gonococci, reappearance of urethral discharge after stroking of prostate.

History.—After an extramarital exposure the patient had developed gonorrhea. By the use of anterior urethral injections this had subsided gradually, so that at the end of seven weeks there were no apparent symptoms of infection and the doctor had pronounced him cured. Fearing that the doctor might possibly be in error he had sought confirmation of his supposed cure lest he infect his wife. Questions regarding the types of injections he had used brought out the fact that the treatment had been started with 10 per cent. argyrol, and finished with a fluid containing a white sediment, probably an astringent. There at no time had occurred any symptoms to suggest spread of the infection to the posterior urethra and prostate gland.

Examination.—Because of the probable use of astringents, the absence of urethral discharge, and the crystalline urine, the patient was instructed to discontinue treatment and was given a slide for the collection of any discharge that might appear. Upon his return, two days later, he was in the same condition and no discharge had made its appearance. At this visit, without any irrigation, the prostate gland was gently stripped and its secretion forced into the anterior urethra. The prostatic secretion contained a large number of pus cells, but no gonococci could be found. Upon the following day he returned with a frank urethral discharge, containing many gonococci. The first glass of urine was hazy and the second was clear.

Discussion.—A particularly mild course of gonorrhea the treatment of which was apparently ended with the use of an astringent injection, and in which the diagnosis of cure had been based solely

upon a freedom from discharge and a clear urine, dictated caution. It was the course of wisdom to stir up any residual infection and not to be too hasty about agreeing with the former physician's pronouncement of cure. That the posterior urethra and prostate gland had become infected without symptoms is not so singular as one would be led to believe by the text-book descriptions of such disease extension. In fact, it is rather common to see practically asymptomatic-posterior urethral involvement when the anterior urethra has been gently treated from the beginning of the infection, and particularly if astringents have been used.

Such a case accentuates the importance of investigating the prostate after the supposed cure of every mild gonorrhea that seemingly has not extended beyond the anterior urethra. Much of the gonorrhea of the day is due to the neglect of efforts to demonstrate possible dormant foci of infection in such patients. If there are no gonococci present, the passage of a sound or massage of the prostate will do no harm, and if they are present, it is far better to stir them into activity than it is to tell such a patient he is cured.

Treatment.—With such a high degree of latency of infection one could with safety carry out intravesical irrigations and prostatic massage. Done with sufficient care, the patient should go progressively on to cure without the development of further complications.

Case 26

Almost immediate latency of infection from astringent fluids, with recurrence of gonorrheal discharge when treatment was discontinued.

History.—Four weeks before he had developed gonorrhea, and immediately had gone to an urologist who started treatment at once. The treatment had consisted of three intravesical irrigations a day of borosalicylate of zinc (Neisser-San-Kahn) by the physician and four anterior injections by the patient. Since the second day there had been no evidences whatever of the disease.

Examination.—Considering his treatment, and the fact that he had an absolutely dry urethra and a crystalline urine, he was instructed to stop all treatment and return in three days. At the end of this time he was able to express a minute quantity of pus containing countless gonococci.

Discussion.—We here see a mild attack of gonorrhea thrown into almost immediate latency by repeated treatments with an astringent fluid; a patient who changed physicians because he felt he was "being treated for his pocket-book and not his disease." He thought he was well, but wanted to make sure.

Treatment.—Fortunately he presented no great problem from a therapeutic standpoint, and responded rather quickly to careful treatment aimed at producing mild mucosal stimulations as has been advised in our text.

Case 27

Persistent urethral discharge, uncured by astringents, and cleared up by attention to the causal prostatic infection.

History.—Four months before this study the patient had developed a scanty urethral discharge, which was negative to gonococci on two occasions. He had been given a "Neisser-San-Kahn" injection to use himself, and had "cleared up in a few days." A month later the discharge had recurred, and again was negative for gonococci. A few injections of his astringent would make all but the slightest morning discharge disappear, only to return when the treatments were discontinued.

Examination.—The urethral discharge, which was hardly perceptible during the day but much greater in the morning, showed much epithelium, many pus cells, and staphylococci. The first glass of urine contained a few shreds and the second was clear. The prostatic fluid was about 75 per cent. pus with much clumping. Repeated smears of the obtainable secretions failed to show

any gonococci, nor did prostatic massage cause any increase in symptoms.

Discussion.—It is so common to find gonococci in the urethral smears of patients who have been pronounced free from them that one cannot rely too implicity upon such statements in history taking. The history here blends so well with that of gonorrhea treated with astringent injections that one could not be too careful in his solution of the question as to whether or not the patient had had gonorrhea. Four months had elapsed since the beginning of the trouble, a sufficient time for the gonococcus to have disappeared under ordinary conditions.

Simple, non-specific urethritis, however, hardly would have lasted so long, and this fact itself should have aroused the suspicion of deeper pathology. The probable course of events was that the patient did not have gonorrhea, that the negative smears were correct, but that the discharge from its beginning was due to his chronic prostatitis.

Treatment.—That the discharge present on examination was due to his prostatic infection was evidenced by the fact that it permanently disappeared within two weeks of the institution of prostatic massage.

Case 28

Prolonged retention of gonorrhea in juxta-urethral sinuses, transference of infection to woman, reinfection of his own urethra, failure of sinuses to cure on iodine injections.

History.—Eighteen months before the patient had experienced an attack of gonorrhea, which had gradually subsided and had been pronounced cured at the end of four months. Several months after this he had been accused of infecting a young woman, but, as nothing suggesting gonorrheal infection in him could be found, it had been assumed that the young woman had had other friends. Shortly before the present study he had thought he squeezed some

pus from a small opening on the edge of the meatus, but had not been sure. On the day preceding his first visit he had been able to express a small yellow bead of pus from the same opening.

Examination.—Careful study showed that upon each lateral margin of the meatus was the minute opening of a juxta-urethral sinus. From both of these could be expressed secretion containing many gonococci. A small wire was passed about a centimeter into each side.

Discussion.—Unquestionably he had carried his infection in these poorly draining juxta-urethral sinuses, and it is more than probable that they were the source of the woman's gonorrhea. Such a possibility makes the closest scrutiny of the meatal margins of every gonorrheal urethra a highly important procedure. These abnormal sinuses are by no means rare. Usually the patient calls the doctor's attention to them during the subsiding stage of his infection, if the physician has not already discovered them.

That they continued to harbor gonococci after being ballooned with tincture of iodine, and cleared up after being treated by a far less potent bactericide, adds very little to the generally accepted basic ideas of treatment.

Treatment.—With a blunt needle both sinuses were injected with 5 per cent. tincture of iodine three times in ten days. Directly after the third treatment he developed a mildly acute gonorrheal urethritis. As it was still possible to obtain gonorrheal pus from the sinuses, they were injected with 5 per cent. silver nucleinate solution upon several occasions. The urethral gonorrhea remained anterior and went on to cure with the treatment described in our text without complications, as did also the infection in his sinuses.

Case 29

Non-specific urethritis due to irritation of postmenstrual vaginal secretions.

History.– The patient was a highly respected man, who had been married for a number of years. He had never had any disease of his urogenital structures until eighteen months before this study. At that time he had awakened one morning with preputial itching, a burning sensation on the glans penis, and a slight urethral discharge. He had visited his physician, who had had a smear examined, and pronounced it a non-specific urethritis. After using an urethral injection for a few days the condition had cleared up. It had recurred, however, upon a number of occasions and rapidly disappeared on treatment. The attacks had been a month or two apart.

Examination.—The urethral discharge was composed of pus containing a large assortment of bacteria, but no gonococci. There was a very mild grade of balanoposthitis. The prostatic and seminal fluids were normal. The first glass of urine was slightly hazy, and the second was clear.

Discussion.—The periodicity of his attacks suggested that they might bear some relation to his wife's menstruation. It is not uncommon for the change in the vaginal secretions of some women at this time to be of a highly irritating nature, sufficiently so to occasion just the condition he presented. The closest inquiry along this line failed to bring out such an association of events. He was sure that the attacks did not accord with his wife's menstruation. So positive was he that such was not the case that inquiry was pushed further, with the result that he hesitatingly admitted that for the last year and a half he also had had a mistress. He had no difficulty in associating his attacks with her menstruation. Further recurrences were prevented by the use of a condom after her menstruation.

Case 30

Gonorrhea with posterior complications as the presenting symptom, anterior involvement following coitus and chemical irritation.

History.—Three weeks before the patient had noticed pain at the right inguinal ring on coughing. The pain steadily grew worse, and a swelling soon had appeared at the inguinal ring and traveled down the cord to the epididymis, which also had become very tender and painful. Two weeks from the onset of this condition he had had coitus, and immediately used an injection of 2 per cent. protargol solution as a prophylactic. This was immediately followed by a discharge, which had continued until his study, one week later.

Examination.—He presented an urethral discharge containing many gonococci, a large tender right epididymis, with a slightly thickened vas deferens. Both glasses of urine were cloudy.

Discussion.—To unravel this seeming mystery we must begin in the middle. Unquestionably the gonorrhea was not contracted at the sexual exposure, occurring two weeks after his pain at the inguinal ring. Beyond a doubt it was there before, and was stirred into activity in his anterior urethra by sexual indulgence and 2 per cent. protargol. It has been mentioned in our text that it occasionally happens that the first subjective symptoms of gonorrhea occur in the posterior structures; that anterior gonorrhea can be of such a mild character that the patient is not aware of it until the posterior urethra becomes infected. Here we find a patient who was not aware of it until the vas deferens was involved. Likewise, we see one of those unusual cases of infection of the epididymis by continuity of surface. It is the common observation that in at least 98 per cent. of all cases of epididymitis the epididymis is involved first, and if there is any involvement of the vas, it starts at the epididymal extremity and passes upward.

Treatment.—The treatment of similar cases has been outlined so frequently as to need no repetition here.

Case 31

Prolonged latency of infection due to wine at meals; infection of several woman, with death of one; pronouncement of cure without real study by many physicians, chronic gonorrheal prostatitis.

History.—Four and a half years before the present examination the patient had contracted gonorrhea, and after several months of treatment had been pronounced "cured." There had been no microscopic studies upon which to base such an opinion. Within two weeks of this time he had infected a young woman.

Following this experience he has subjected himself to several months of treatment. Other than the slight discharge on the morning after drinking an unusual amount of beer, he saw no signs of disease. He again was pronounced "cured," but, rendered cautious by his former experience, he had visited another physician, who likewise, without microscopic study, pronounced him cured. For six weeks thereafter he had refrained from coitus, and finally indulged, with same result as before, he infected his partner.

Terribly shocked by this, he had spent a year and a half in the hands of several physicians in his own city. As formerly had been the case their treatment consisted of oral medication and various types of anterior urethral injections. One physician had passed a sound upon one occasion, but there had followed such a profuse discharge that he had not repeated it.

Again pronounced cured, he had visited five physicians, in his own city, who all had pronounced him free from disease. Still skeptical, he refrained from sexual experiments for many months. When he again had tried the experiment the young woman had become infected, and finally had died as the result of an operation for pyosalpinx.

Examination.—There was no urethral discharge and only a few small shreds in the first glass of urine. The prostatic secretion was practically 100 per cent. pus, and contained a few gono-

cocci. On the morning following the prostatic study an urethral smear was obtained, which contained a large number of gonococci. In seeking a reason for the prolonged persistence of gonococci, he stated that he had always had one or two glasses of wine with his meals, that he had been told not to drink, but had not considered this drinking.

Discussion.—Much of this history is best not discussed. It would seem almost impossible for one to find so many physicians willing to pronounce him cured without some sort of microscopic study. True, there usually was no discharge, but some one must have been told that one would appear after he drank an unusually large quantity of beer. Familiarity with practice conditions in his city makes things much easier to understand.

Aside from the depressing sociological aspects of his case, we see a patient who, during the entire period, had had wine at his meals and thereby kept in abeyance his combative processes. This high degree of latency over such a long period of time is somewhat unusual. The physician who stirred it into activity, had he have had a greater familiarity with the ways of the disease, might have seen where the trouble lay. His feeding focus was a gonorrheal prostatitis, but no one had ever stirred it but the once.

Treatment.—The paramount indication was to stop the wine at meals. Next of importance was the treatment of his prostatic infection. As was to be expected, there was a series of recurrences of his urethral discharge following the prostatic treatments. These gradually subsided, after which he went slowly but surely on to cure. With such a history one should have more than the usual amount of hesitancy about saying he was cured. Before such a pronouncement was made full-sized sounds should be passed to the bladder on a number of occasions; he should be instructed to drink large quantities of alcoholic drinks, subject himself to sexual excitement, and as a last resort, several large doses of gonococcal

vaccine should be given. And, when one had every reason to think he was cured, there should be one or more complement-fixation tests carried out, and the patient should be urged not to try any sexual indulgences without a condom for many months. During all of this probationary period the patient should be supplied with glass slides that he might collect for microscopic study any urethral secretion that appeared.

Case 32

Recurrent marital gonorrhea wherein the male became practically a symptomless carrier of infection, with later infection of another.

History.—Five years previous he had contracted gonorrhea and had infected his wife. Upon the resumption of marital relations with her some months later he had experienced another attack, and during the following three years the same thing had happened upon four occasions. He was of the opinion that each attack had been milder and shorter than its predecessor, except that following the last one there had been a morning discharge for about three months. This finally had disappeared and, though he had cohabited constantly with his wife thereafter, there had never been any symptoms to suggest that either still harbored an infection.

Three months before this history was taken his wife had died after an illness lasting about two months. During her illness, and for two months after her death, he had had no sexual contacts. He then had established such relations with a young woman who, two weeks later, had developed what proved to be acute gonorrhea. Having no reason to suspect her, his suspicions naturally turned toward himself as the result of his past history.

Examination.—There was almost a dry urethra. After vigorous urethral stripping a small amount of mucoid material was obtained, which showed epithelial and pus cells, but nothing resembling gonococci. There were some shreds in his first urine, which upon

careful study failed to show any gonococci. The prostatic secretion showed a large quantity of pus, but no gonococci could be found in it.

Upon his return three days later, two days of which were spent in almost a semi-intoxicated condition, there was no difficulty experienced in demonstrating many gonococci in both the urethral and prostatic secretions. The reaction occasioned by so much liquor had not been sufficient to cause any symptoms of which he was conscious. In fact, the only objective change was a very slight haze in his first glass of urine.

Discussion.—It has been mentioned in our text that repeated reinfections by the same "strain" can engender a tissue change whereby the individual becomes an unconscious carrier of gonococci. We here see an excellent example of this in a male. The country teems with female "carriers."

Treatment.—Exhibiting such a high degree of latency, it would be supposed that such an infection in the male would be almost impossible of cure. Such, however, does not seem to be the case. The infection is, as in others, harbored in the more poorly draining mucous channels, particularly in the prostate, and when these feeding foci are directly attacked no great difficulty is encountered in clearing up the infection. Their treatment does not differ from like conditions in other individuals and needs no special description here.

Case 33

Gonorrhea, great trauma, prostatic abscess, epididymitis, great resultant pathology, and prolonged presence of gonococci.

History.—In December, 1919 he had developed an urethritis which had quickly involved the posterior urethra. During the acute posterior infection his physician had given daily instillations of argyrol into the bladder with a Keyes-Ultzmann syringe. The posterior symptoms had gradually subsided, and the physician had

passed sounds to the bladder three times. Following the last passage of the sound by about twenty-four hours, there had developed great pain in the prostate. It was almost impossible for him to pass urine, and the temperature reached 103° F. A week later a large prostatic abscess ruptured into the rectum. On the day that this occurred there developed a markedly acute right epididymitis, followed by great swelling of the vas. Within four weeks his physician had resumed the passage of sounds and was massaging the prostate. At the end of his fifth week in bed he changed physicians.

Examination.—At this time the epididymis was large, but not tender, there was a profuse gonorrheal discharge, with two cloudy glasses of urine. The prostate, vesicles, and intervesicular space were one hard mass of inflammatory tissue that was exceedingly tender.

He was then placed upon rectal heat twice a day by means of a rectal pyschrophore, with intravesical irrigations of warm permanganate of potash solution twice a day. Under this he quickly improved, so that a month later it was possible to carry out the gentlest prostatic and vesicular strokings without pain or local reaction.

Shortly after this he went into the service, where he was, soon after his arrival in France, labeled chronic gonorrhea, but received no local treatment. There was merely an intermittent, scanty discharge until June, 1918, when it became profuse after a night of alcoholic and sexual excesses in Paris. Returning to Brest he was treated for forty-six days by argyrol, silver nitrate, and sounds. Having then a clear urine and no discharge he was pronounced cured. This must have been an error for, without any possibility of a new infection, the discharge returned in two weeks. There were several such recurrences of discharge until September, 1920, when he was discharged from the service at a time when the symptoms of gonorrhea were not in evidence.

Second Examination.—A study made immediately upon his return to this country showed the gonococcus to be present, the first glass of urine cloudy, and the second to have a slight haze. The subvesical structures were still indurated, but it was possible to make out the prostate and vesicles.

Discussion.—In a case of this type one can only come to one conclusion, viz: The chronicity was due to the great pathology caused by the use of a Keyes-Ultzmann syringe and sounds during acute posterior urethritis. One almost never sees prostatic abscess in the absence of trauma.

Treatment.—With so much lower-tract pathology the early therapeutic efforts must be approached with the greatest care. Roughness of any type to the prostatic or vesicular regions easily can produce abscess formation and possibly recurrences of epididymitis. Unquestionably, such an individual can be rendered free from gonococci by irrigations and gentle stroking of the subvesical plaque of inflammatory tissue. Much judgment is required, however, in the conduct of such a case, as it often is necessary to suspend treatments owing to some temporary acuteness of symptoms. There at times is a grave question regarding one's ability eventually to restore the structures to a condition where no pus can be found in the expressed secretions. Commonly such a prostate will have such large uncollapsible cavities that they will not permanently remain pus-free. There from time to time will be a haze or shreds in the first urine which the patient may be taught to disregard. The thing of first importance under such circumstances is that the gonococcus be no longer present.

Case 34

Apparent virulence of infection, with little resistance to the disease really due to the continued misconduct of the patient.

History.—Five months before his first visit he had contracted gonorrhea. For the first two months he had been in the hands

of a general practitioner, who had given him no local treatment whatever. He then had visited an urologist who had placed him on very gentle local treatment. Despite this he had continued to have his discharge and had failed to make any improvement whatever, much to the annoyance of his doctor.

Examination.—There was a profuse urethral discharge, containing countless gonococci and a cloudy first and hazy second glass of voided urine.

Discussion.—At first thought one would conclude that he was dealing with an individual exhibiting little, if any, resistance to his infection. Questioning brought out the fact, however, that during the entire time he was subjecting himself to sexual excitement, drinking alcoholic liquors, and even having sexual intercourse from time to time. He would have been equally frank about this with his other physicians, but he stated they had never asked him about it. Lack of knowledge regarding the patient's laxities apparently had led the urologist to think he was dealing with a particularly virulent gonococcus in a patient with little resistance against it.

Treatment.—In so far as the question of treatment was concerned he presented no peculiar problems, for so soon as he corrected his habits the disease quickly subsided into a state of inactivity, wherein intravesical irrigations at low hydrostatic pressure were safe. After the institution of prostatic strokings, which was possible within a few weeks, he cleared up promptly without further complications.

Case 35

Urethral discharge due to an untreated postgonorrheal prostatitis.

History. Three years before he had had a severe attack of gonorrhea with posterior involvement. For two months he had been treated with intravesical irrigations and discharged as cured.

Leading an exemplary life, there had been nothing to suggest that he had not been entirely cured until six weeks before this history was taken. At that time he had contracted a severe cold, for which he had consumed a large quantity of whisky. Following this there had been a persisting but scanty urethral discharge, which had contained no gonococci.

Examination.—The scanty urethral discharge contained pus, but no gonococci. The prostate was swollen, and from it was expressed a large amount of secretion composed almost entirely of pus.

Discussion.—This history is typical of a laxity that long has characterized our curative efforts. An anteroposterior urethritis had been treated by irrigations and no attention whatever had been given the prostate, which, from the nature of things, must have shared the infection. His freedom from exciting influences had allowed his natural resistive powers to eliminate the gonococci, but there had remained an inflammation due to secondarily invading bacteria upon the prepared soil.

An enormous percentage of the cases that we now treat for systemic symptoms, resulting from a focus of suppuration in the prostate gland, belong to this same category. In fact, the number of such is so great as to make the curing of such postgonorrheal lesions a most imperative prophylactic procedure against the occurrence of that multiplicity of crippling eventualities of the years to come.

Case 36

Gonorrheal infection of abnormal seminal tube with escape of urethra, injections into seminal tube followed by acute epididymitis.

History.—The patient had developed a discharge three weeks before the present study. He had been given a mercurochrome injection to use himself. After two weeks of its use he had experienced an acute epididymitis.

Examination.- The glans penis was penetrated by two definite mucous channels. The upper was in the position of the normal urinary meatus and was really the urethral opening. Its mucosa was normal and no discharge whatever could be expressed from it.

About 3 mm. beneath this opening was a transverse slit, through which the patient insisted his seminal fluid came at the time of orgasm. From this opening was obtained considerable gonorrheal pus. The right epididymis was greatly swollen and very tender. Both glasses of urine were perfectly clear, and there was no pus in a centrifuged specimen of the first glass.

Discussion.—Obviously the ejaculatory ducts had failed to fuse with the urethra, but had persisted as one or more tubes having a common opening just below the normally placed urinary meatus. Such a position of abnormal ejaculatory openings is decidedly contrary to our embryological expectations, for, according to Belfield, such occur above and not below the urethra.

That the urethra was not infected speaks well for the protective influence of the squamous lining of the fossa navicularis.

Considering that his hand injections were given into the seminal tubes, which nowhere in their course exhibit any marked sphincteric structures, it is not surprising that epididymal infection took place. The surprising thing is that it did not immediately occur upon both sides. The escape of one side gives ground for a suspicion that perhaps it does not empty but has remained as a closed system.

The result of his injections in causing epididymitis gives rather strong argument for the mechanistic explanation of the cause of his complication, as exhibited in Part One.

Treatment.—From a therapeutic standpoint such a case presents some very interesting points. To continue local treatments to the infected seminal tube is practically sure to cause infection of the other epididymis if its ejaculatory duct fuses with the other tube. The probabilities of permanent sterility are so great that

a boy of eighteen should not be subjected thoughtlessly to the risk. It, therefore, is undoubtedly the safer procedure to carry out no local treatment, leaving cure to his own immunity processes. Just how soon he might be able spontaneously to overcome his infection is a question that cannot be answered. Such a tube hardly compares with the urethra, with its repeated flushings with urine. It perhaps bears a greater similarity to the various para-urethral mucous channels which frequently hold gonococcal infections for great lengths of time. The preservation of his procreative powers, however, make the slow, conservative course of greater value. Were this not a factor, it probably would be a simple matter to obliterate the tube so that there would be no drainage whatever. If unable to drain at all, the structures eventually would sterilize themselves. Such a course, however, might lead to seminal vesicle complications, which, in the absence of drainage possibilities, might make surgical means of drainage necessary.

Case 37

Prolonged treatment to "cure" a normal amount of urethral mucus.

History.—The patient was a decided blond, twenty years of age, and of a nervous temperament. On the morning following his first sexual exposure he had been able to express a small amount of fluid from his urethra. He at once had visited his physician who, without study, had prescribed an urethral injection, which had been used twice daily for six weeks. At no time had there been more than a small bead of secretion, and this only had been present on arising. The injections had made no change in it whatever, so he had stopped using them, but had not been able to stop worrying.

After a few months he had visited another physician who had advised protargol, later another had given him argyrol. In all, he had been treated by five physicians. Neither of them had

been able to find any discharge present, but each had tried in his own way to cure the condition. No one had asked him to bring in a smear of his discharge, so there had been obtained no evidence beyond his own word that there really was a discharge.

Examination.—Aside from a slight nebula of mucus, so commonly found in any first glass of urine voided immediately after the urethra has been vigorously stripped, the urine was crystalline. The prostate and its secretion were perfectly normal, and he passed a large stream of urine. As there was no discharge present at his visit, he was given a glass slide and told to collect his morning discharge upon it. When stained, this contained no cells whatever, but was composed of normal urethral mucus.

Discussion.—It is surprising how often one encounters patients who have been subjected to months of treatment because they can squeeze some normal mucus from the urethra in the morning. There was nothing in this history to suggest that he had acquired gonorrhea. In the first place gonorrhea in a blond is never so mild as to cause only a slight meatal moisture, nor do the symptoms of gonorrhea appear in twenty-four hours.

Treatment.—None was or had been needed. The urethral mucosa is intended to be moist, and it is more so at twenty than at sixty. His great, good fortune rested in the fact that all of the solutions had been weak ones, so that they had done no urethral damage. His mental anxiety was quieted just so soon as he was told that he had been trying to stop something that was normal to him.

Case 38

Probable non-specific urethritis treated needlessly for months.

History.—Seven months before he had had what he supposed was gonorrhea. This came on a day after the only sexual exposure within months. For the following five months he had injected the anterior urethra from three to four times a day with

10 per cent. argyrol. After this he had attended a dispensary, where he had had sounds passed upon a number of occasions, but no other local treatment.

Examination.—At the end of this time he presented himself with no discharge, a normal prostatic secretion, and two clear glasses of urine. A smear of his "morning drop" proved it to be composed of mucus and epithelium, with a few entangled leukocytes.

Discussion.—There is little reason to think that his original trouble was other than a non-specific urethritis. He had had no previous urethral infection to recur, and there was no real incubation period to suggest gonorrhea. Further, self-treated gonorrheal urethritis almost always involves the posterior urethra. Such extension is always accompanied by prostatic infection. This infection, though the gonococcus may disappear, does not spontaneously clear up. And yet we find him with a perfectly normal prostatic secretion, though he had had no prostatic treatments.

The only justifiable conclusion is that a man with a simple non-specific urethritis had subjected himself to about seven months of needless treatment.

Treatment.—Having had months of needless treatment there was none necessary.

Case 39

Erroneously diagnosed gonorrhea, trauma, prostatic massage advised in a tuberculous individual, later marked prostatic tuberculosis with probable involvement of the left seminal vesicle.

History.—For five years the patient had been a semi-invalid from active pulmonary tuberculosis. Two months before this study he had noticed a slight urethral discharge which had lasted only a few days. Without microscopic study it had been pronounced gonorrheal, and he had been given an urethral injection to use himself. At the end of two weeks his physician had started to pass sounds, and had continued to do so once a week for a month.

He then had made a diagnosis of prostatitis and advised prostatic massage. Before this had been done more than twice the patient came to another city.

Examination.—There was no urethral discharge and only a few shreds in the first glass of urine. The prostate gland was enlarged, tender, and suspiciously irregular in outline, but not hard. Even palpation of the gland caused some of its secretion to appear at the urethral meatus. This proved to be almost 100 per cent. pus, with enormous clumps of pus cells.

Discussion.—A scanty urethral discharge may or may not be gonorrheal, only the microscope can reveal which. The microscope had not been used, but the lack of terrific reaction following the use of sounds in the third week shows that it could not possibly have been gonorrheal. This part of the treatment was, to say the least, ill advised.

Treatment.—The presence of infection in a prostate gland, itself irregular in outline, in an individual known to have active pulmonary tuberculosis, at once calls for caution. Landis has insisted for years that there was a great hazard entailed in massaging prostates in the tuberculous. The writer has seen a number of sad events following such a procedure that bear out the correctness of his contention. The mere presence of pus in the prostatic secretion of such an individual, unless it is gonorrheal, or is causing distant symptoms, gives no call for prostatic massage. Certainly, even in these circumstances, the gland should never be massaged if it gives the faintest suspicion that it is tuberculous. Unfortunately, such glands far too often are massaged.

The patient, therefore, was told of the dangers of such a plan of treatment, and that he was far better off with pus in his prostate gland than he would be with the miliary tuberculosis that massage probably would occasion. All of his attention was directed toward overcoming his pulmonary infection and away from his urogenital tract.

(This judgment proved correct for, when seen six months later, there was an undoubted tuberculosis of his prostate gland and some thickening of his left seminal vesicle.)

Case 40

Gonorrhea, prostatic massage, pulmonary tuberculosis, prostatic tuberculosis.

History.—In February, 1925 there had been an attack of gonorrhea which had received much rough treatment. Three months later a prostatic abscess had developed and ruptured into the urethra. This had cleared up and another had developed later which occasioned urinary retention, which was finally relieved without catheterization. This abscess likewise had ruptured into the urethra. There was then a period of several months, during which he had received many types of treatment, including a course of prostatic massage. In this time there had been several attacks of hematuria, and during the last eight months there had been no urethral discharge, but urination was accompanied by much burning. There had been occasional attacks of pain in the prostate.

For three months he had had a mildly active tuberculous lesion in his lung, and had lost much weight.

Examination.—There was no urethral discharge and only a few small flakes in his first glass of urine. The gentlest stroking of the prostate gland caused its secretion to appear at the urinary meatus. The microscope showed this to contain only a few scattered leukocytes. The reason for the very gentle stroking of the gland was that it was very hard, and had a large, hard nodule in its upper left lobe, together with the fact that at the time there was an active tuberculous lesion of the lung.

Discussion.—There seems to be no question regarding the fact that he had gonorrhea eighteen months before. The question

that arises is as to the true nature of his early prostatic troubles. Unquestionably the prostate was tuberculous at the above examination. There is, however, reason to doubt tuberculosis as a factor in his earlier trouble, for the seizures were of too acute and transient a nature and the first abscess produced a temperature of 104° F.

The probabilities are that he really recovered from his gonorrhea and most of his postgonorrheal pathology during the first year. Just what relation his pulmonary activity bore to his recent course of prostatic treatments it is impossible to say. Though the lung focus was the primary focus to which the prostatic one was secondary, one who has seen many tuberculous prostates that have received massage can not escape the conviction that, if the patient escapes a miliary tuberculosis, as he sometimes does, he is sure to experience reactivation of his lung lesion. Also, one finds that the incidence of renal, vesicular, and epididymal tuberculosis in such patients is enormous.

Treatment.—There were no indications for any local treatments to the urogenital tract. The case belonged to the internist and not to the urologist. He needed an antituberculous régime for his pulmonary lesion, with the chances of the prostatic lesion being able to take care of itself unless too much damage had been done by the more recent massage.

Case 41

Earlier gonorrhea, lymphocystic bodies, massage of tuberculous prostate followed by massive seminal, vesicular, and pulmonary tuberculosis.

History.—There had been gonorrhea a year before and the patient felt that he had not been cured, as he still had a morning drop of pus at the meatus and some shreds in his urine. He had no subjective symptoms.

Examination.—The morning discharge contained pus cells, and the common bacteria of the urethra, but no gonococci. The urine

contained a few small shreds in the first glass while the second was clear. The prostate gland was slightly harder than normal, and two small, hard nodules were present, one on each lateral lobe. The prostatic secretion, which could be obtained by the gentlest pressure, was 100 per cent. pus.

A cysto-urethroscopic study revealed a normal bladder and ureteral orifices, but a posterior urethra literally packed with lymphocystic bodies. The urine contained many tubercle bacilli, but comparatively little pus. The lungs were considered negative on physical examination.

While still in course of study for a possible early renal lesion the patient went to a dispensary, where he received prostatic massage twice a week. On his return there was a massive tuberculosis of the right epididymis and vas deferens.

Three months later he had developed a massive and very active pulmonary lesion for which he was sent to a sanatorium.

Discussion.—It has been urged in Part One that nodulation of the prostate gland should be viewed with grave suspicion, and massage should be withheld until tuberculosis and carcinoma are ruled out. It was probably largely through the assumption that much pus in the prostatic secretion was sufficient reason to massage any prostate that this patient had so many massive tuberculous lesions.

Our older teaching regarding the occurrence of interstitial prostatitis and the nodulation thereof has been productive of much harm. There can be no doubt that the lesion does occur, particularly in the markedly infected gland beyond middle life, but it is certainly a condition of such rarity that it would be productive of greater good if we practically forgot its existence. Unquestionably, by far the large majority of definitely nodulated prostates before the age of fifty are due to tuberculosis. After that age one thinks most of carcinoma, though tuberculosis is by no means rare.

Treatment. There was every reason to avoid local treatment and rely upon the usual sanatorium life of the tuberculous. Certainly the outlook of the patient was better thus than if subjected to efforts aimed at the surgical removal of his urogenital lesions. Such massive removals are being attempted, but the more one sees of the results of lower-tract tuberculosis that has been allowed to run its course without meddlesome trauma, the less inclined will he be to subject his patients to such dangerous and mutilating procedures.

Case 42

Urethral discharge due to an overlooked tuberculous prostate treated as anterior urethritis; unrecognized active pulmonary tuberculosis.

History.—Seven years before he had had a gonorrheal infection that had been pronounced cured after three months of treatment. Five years later, on the morning after an isolated sexual exposure, he had been able to obtain a small quantity of fluid from his urethra. Without microscopic study he had spent two years using an assortment of urethral injections without improvement. During this time he had lost much weight, had become anemic, and complained of marked flatulence and pain in the stomach, stating that it "hurt to eat." Despite these latter complaints he had received no treatment except the above.

Examination.—The scanty urethral discharge contained pus and many pneumococci. The first glass of urine contained shreds, while the second glass was clear. The prostate gland was large and presented a number of hard nodules. It was typically an advanced tuberculosis.

Study by an internist revealed an active pulmonary tuberculosis also.

Discussion.—The lapse of five years between an attack of gonorrhea and the appearance of a purulent discharge is ample evidence that it is not due to a recurrence of his former infection.

Likewise, its discovery the morning after an isolated sexual contact is equally strong evidence that it is not a new gonorrhea. That it was discovered at this time was unquestionably a matter of conscience. It would have been discovered before if it had have been looked for.

The entire clinical picture should have suggested tuberculosis to the physician in charge. Perhaps the patient's greatest good fortune rested in the fact that he fell into the hands of one to whom a clear second glass of urine always means anterior urethritis alone, for which reason he escaped prostatic massage, with its probably resultant miliary tuberculosis.

Treatment.—The therapeutic indication was for sanatorium treatment for his tuberculosis. There was a time when prostatic tuberculosis was considered to be a very grave lesion. Further experiences have demonstrated that, if such a gland escapes digital attack, it generally will play itself out. This "playing-out" process generally requires several years, during which time it commonly causes surprisingly little local annoyance to the patient. If one compares such conditions treated by general hygiene with those receiving surgical intervention, such as total prostatectomy or more extensive removals, he is hardly likely to condemn many such individuals to these procedures.

Case 43

Prolonged gonorrheal infection due to the patient's misconduct, lymphocystic urethral lesions, urethral "numbness" due to mass in sinus pocularis.

History. Beginning with gonorrhea eight months before he had continued with a discharge, and later had developed a numbness in the urethra that often had prevented sleep. During this entire time he had been under the care of his physician. The plan of treatment had consisted of oral medication for the first

few weeks. Later he had been given urethral injections, which he had used himself at rather frequent intervals. As the discharge continued sounds had been passed upon a number of occasions. Despite everything he or his doctor could do he would have a profuse discharge for a few days, after which it would almost disappear only to reappear and pursue the same cycle.

Examination.—At the end of eight months of these experiences there was a moderate discharge containing many gonococci. The first glass of urine was cloudy and the second clear. The prostatic secretion was full of pus.

Discussion.—It has been shown by our graphic charting that, after the stage of decline of the urinary picture has set in, the course of the disease is not ordinarly marked by sudden, spontaneous changes. When such occur they rarely are due to the disease per se, but are the result of some avoidable influence. In this patient the regularity of the changes at once suggests that either he or his physician were doing something to cause them. While it was possible to associate some of these cycles with the passage of a sound by the physician, such events did not really accord with the regularity of the symptomatic cycles. The physician was, therefore, absolved from some of the blame, and it required but little inquiry to establish the fact that for months the patient had indulged in coitus, per condom, once a week, and at times twice. Also, it was simple to establish the fact that the increase in symptoms occurred on the morning after the "sex trauma." It likewise was equally simple to elicit the fact that the patient knew why he was not getting well, but being engaged to marry the woman who was thus favoring (?) him sexually, he dreaded to discontinue the attentions for fear of losing his prospective bride.

Treatment.—When positively told that he could not continue such conduct and recover from his gonorrhea, a thing he had begun strongly to suspect, he found a suitable alibi and discon-

tinued his sexual relations. By the use of irrigations and prostatic massage he improved to a point where no more gonococci could be found, nor could any return of his former discharge be occasioned by either sexual excitement, and probably coitus, though he denied it, but the prostatic condition reached a stationary stage beyond which it did not improve, and there developed a slight burning on urination in addition to a feeling of numbness in the urethra.

Late in the treatment of postgonorrheal prostatitis, after the gonococcus apparently has been absent for a number of weeks, burning upon urination is not a common symptom. When it does appear and persist, in the absence of calcium oxalate crystals in the urine, it almost invariably means that the patient has a number of lymphocystic bodies in his posterior urethra. A cysto-urethroscopic study proved this to be the case. There was also a glandular mass protruding from the sinus pocularis.

In the chapter upon the relation of lymphocystic urethral lesions to gonorrhea it was stated that a residual prostatic infection will not go on to cure so long as these bodies are present. Consequently, the indication was to stop the prostatic treatments until such time as the bodies were entirely destroyed. This was accomplished by topical applications of 50 per cent. $AgNO_3$ through the endoscope, after which the prostate rather promptly responded to massage. The glandular protrusion from the sinus pocularis was destroyed by fused silver nitrate on a small probe. This mass unquestionably was responsible for his feeling of numbness in the urethra and its destruction removed the symptom.

Having in mind the close association between these urethral lesions and some distant tuberculous focus, a close study for such a condition was carried out. Beyond evidences of quite an extensive old, apparently healed lesion in the lung no other focus could be located. A mild grade of anemia and some loss of weight, however, indicated a reconstructive régime, which was carried out.

Case 44

Extreme chemical irritation to the anterior urethra, overlooked prostatitis, prolonged urethral discharge and discomfort, lymphocystic urethral lesions.

History.—Two years before he had contracted gonorrhea, and had been given an irrigation every day for eight months without improvement. In despair he had changed physicians, had been given an injection having a powdery sediment, and was "well in one week." A year later, having had no sexual contacts for three months, he had noticed an itching along the urethra and two weeks later he developed a morning discharge. For this, he stated, the physician had injected 10 per cent. silver-nitrate solution into the urethra once a week for twenty-two weeks. This would be held in as long as he could stand it. After each treatment there had been a profuse bloody discharge for several days. Following this, he had been given a course of two prostatic massages a week for eleven weeks. The discharge then was present all of the time, but he had noticed an increase of it when he walked any distance. The urethral discomfort and itching had continued, and there was considerable burning in the canal during urination.

Examination.—The urethral discharge was composed of pus, epithelium, and ordinary urethral bacteria, but no gonococci. The first glass of urine contained shreds, and the second was clear. The prostatic secretion was 100 per cent. pus, and the seminal vesicle strippings showed no entangled pus cells.

A cysto-urethroscopic examination showed the posterior urethra to be literally lined with lymphocystic masses, and the anterior urethra was pale and covered with shreds, as one would expect it to be from the insults it had received. There was evidence of an old healed pulmonary lesion, but no signs of activity could be elicited.

Discussion.—Practically no human urethra can be irrigated daily for eight months without having a constant discharge from

the treatment alone. The seeming success of the second physician rested in the fact that he temporarily checked the discharge by an astringent injection and that it was not continued too long. The discharge would have stopped almost as quickly if he had done nothing. A mistake that both made was not to determine the existence of a prostatitis that was then present and was a factor in his later difficulties. The presence of a morning drop of pus in the absence of exposure, and two years after an attack of gonorrhea, should have immediately cast suspicion upon the prostate. Chronic prostatitis alone does not cause itching and burning on urination. One, however, perhaps easily could overlook this fact in view of the urethral devitalization of overtreatment during his previous attack. Certainly nothing should have tempted a physician to use injections of strong silver nitrate. We may question the ability of a patient to hold 10 per cent. in his anterior urethra, but his story of bloody discharge certainly bespeaks a stronger solution than should ever be used in the anterior urethra.

Further along in his history we find a long course of prostatic massage without result. It is our experience that if eight or ten such treatments have not caused a marked improvement in the symptoms there is some pathology other than prostatic infection that requires a cysto-urethroscopic study.

Treatment.—As experience has amply shown that an infected prostate gland will not clear up, no matter what the treatment, so long as there are lymphoid and cystic masses in the posterior urethra, the first indication was to remove them. This was rather easily done by topical applications of 50 per cent. silver-nitrate solution through the endoscope. When these were completely destroyed the prostatic infection was cleared up by systematic massage. As it cleared up the discharge ceased and the urethral discomfort disappeared. The urinary shreds persisted, and probably will for many years, as an anterior urethral mucosa seldom wholly can recover from the effects of such gross mistreatments.

Though there were no evidences of stricture formation at this time, such a later possibility should be brought to the patient's mind and the urethral caliber should be watched for some years. Surely there had been sufficient trauma to expect much urethral narrowing in the years to come.

Case 45

Recurring prostatitis from other foci of infection, with permanent cure after their removal.

History.—Three years before this examination the patient had contracted gonorrhea, and, though he had had no discharge for the last year, he had had prostatic massage every three or four days during the last eighteen months. During this latter period he had experienced a frequency of urination during the day.

Examination.—Despite his statement that his urine showed many shreds both of his voided glasses were crystalline, and a centrifuged specimen of the first glass showed it to contain no pus. The prostatic secretion was normal. It was a simple matter to elicit the fact that his diurnal frequency of urination was due solely to habit. He was sure he still had some diseased condition, and feared that he might harm his bladder by allowing it to overfill.

He was advised to correct his psychological meddling with his bladder function and to have no treatment for three months, at which time he should have his prostate restudied.

Further Course.—He returned at the end of three months with a very slight morning discharge of pus at the meatus, a few flakes in his first glass of voided urine, and a moderate amount of pus in his prostatic secretion. These promptly cleared up after a course of prostatic massage. Three months after he was discharged as cured, he returned in about the same condition as was present six months before. As such recurrences of prostatitis after apparent cures are suggestive of a focus of infection elsewhere in the body, he was advised to have his teeth and sinuses

carefully studied, as his tonsils had been enucleated. Two of his lower molar teeth were shown to have definite apical suppuration and they were extracted. The prostate was again rather quickly rendered pus free, and it has remained so.

Discussion.—The only criticism one possibly could make of the treatment of his gonorrhea is that his first course of prostatic massage was perhaps needlessly long. His subsequent course accentuates the wisdom of giving attention to other suppurative foci in the presence of prostatic infections, particularly where these show a definite tendency to recur after having been rendered pus-free.

Case 46

Recurrences of prostatic infection, with its secondary urethral discharge, as the result of multiple dental infections.

History.—On May 23, 1921 the patient, a young man, had been brought in by his uncle, who stated that, "no matter what story he told, he had gonorrhea." There had been no sexual exposure for six weeks. The discharge had appeared suddenly following some pain and discomfort at the vesical outlet. It was profuse, contained countless pus cells, but no gonococci could be found in it on a number of studies. The first glass of urine was cloudy, and the second contained blood. A few drops of blood oozed from the urethra after urination—a true terminal hematuria. After the second glass of urine had cleared up, as it did in a few days, the patient was given intravesical irrigations of permanganate of potash solution at low hydrostatic pressure until May 30th. Upon this day he played tennis, after which he passed a quantity of blood in his urine. This, however, caused no return of his urethral discharge, which had quickly stopped. The urine then promptly cleared up so that it soon was possible to obtain his prostatic secretion for study. This was large in quantity, 100 per cent. pus, and contained no gonococci. There was no re-

appearance of urethral discharge occasioned by the prostatic manipulation. Routine prostatic treatments cleared the pus from the prostatic secretion, and he was discharged as cured on August 1, 1921.

On October 11th of the same year he was restudied and found to have no signs of any urogenital infection.

February 25, 1922 he returned in exactly the same condition as when first seen. Repeated searches failed to show any bacteria but a few scattered staphylococci. He followed much the same course as before, and was discharged as cured June 8, 1922.

December 12, 1922 he developed a slight morning discharge, and a prostatic study showed about 20 per cent. of pus in his prostatic fluid. After two months of irrigations and prostatic massage, his secretion was again pus free and he was allowed to discontinue treatment.

March 15, 1923 a morning discharge of pus again occurred, and his prostatic secretion showed about 15 per cent. of pus. It will be recalled that at about this time it was beginning to filter through our minds that many of our supposedly idiopathic prostatic infections were, in reality, secondary to some distant focus of infection, usually in the teeth, tonsils, sinuses, or gall-bladder. As his tonsils had been enucleated several years before he was urged to have his sinuses studied and his teeth *x*-rayed. The sinuses were pronounced negative, but there were a number of infected tooth-roots. Counting fillings and extractions, the dentist had to do twenty-nine separate "jobs" before his mouth was pronounced normal.

During this period of dental attention nothing was done to the prostate, but it was afterward rendered pus free and has remained so ever since.

Discussion.—Such cases are by no means rare and, without the most careful microscopic studies, they are almost sure to be pronounced gonorrheal. His first symptoms of vesical outlet dis-

comfort and terminal hematuria undoubtedly were due to the rupture of a submucous pus-pocket at or near the vesical sphincter. The urethral discharge was secondary to this. His frequent recurrences after apparent cures were unquestionably secondary to dental infections, and accentuate the importance of a careful study for distant foci of infection in every case of idiopathic prostatitis. In fact, it is by no means a bad plan to do the same with every patient who presents any prostatic infection, even though it be definitely postgonorrheal.

For so many years it has been fixed in the medical mind that every prostatic infection was gonorrheal in origin, despite the patient's insistence that he has never had gonorrhea, that it will be a long time before the impression is generally corrected. Alert internists are gradually beginning to associate tooth, tonsil, and prostatic infections in their efforts to eradicate infective foci in that seemingly endless number of patients showing the often bizarre systemic manifestations of such conditions. Surely our knowledge of these conditions has advanced far beyond the stage where we can disregard the prostate because it feels normal to the finger and the patient insists that he has never had any venereal disease. The finger in the rectum may detect marked prostatic pathology, but nothing but microscopic study can show that the gland is free from disease.

Treatment.—The treatment of such a case is entirely that of follicular prostatitis and attention to other infective foci.

Case 47

Traumatic treatment of one attack of gonorrhea, possible cure, prolonged courtship without signs of disease, and either recurrence or new attack five days after marriage.

History.—In October, 1918 he had contracted gonorrhea, for which he had received much treatment of a character hardly

likely to bring about a quick cure. Also, he had from time to time consumed much alcohol and indulged in both sexual excitement and coitus upon a number of occasions. In the following February his physician had pronounced him cured. About this time he had become greatly interested in a young woman. For this reason he had corrected his habits so that until the following October he had had no sexual intercourse nor alcohol, but there had been much sexual excitement. During this time he presented no symptoms of the disease, and in September, 1919 had been studied by an urologist who pronounced him free from disease.

In October, 1919 he had married, and five days later had developed an acute gonorrheal discharge. His wife likewise had become infected, and subsequently had an operation for pyosalpinx.

In December he had developed epididymitis on the left side, and two days prior to his first visit the right epididymis had become involved. There had been much local treatment of a decidedly meddlesome sort, much sexual excitement, and some coitus, the latest on the evening before his last attack of epididymitis. There had occurred an attack of gonorrheal arthritis in January, lasting six weeks.

Examination.—From a diagnostic standpoint much study was contraindicated and little was needed at the time. The presence of an acute epididymitis, gonococci in the urethral discharge, and a first and second cloudy glass of urine immediately makes the diagnosis of anteroposterior involvement with its concomitant prostatic infection and leaves only the question regarding the condition of the seminal vesicles. This question probably needs no positive answer for weeks.

Discussion.—In this history we find a number of outstanding points of interest. The first question to arise in one's mind is the question as to whether or not his first attack of gonorrhea was really cured. There are a number of points aside from the opinion of two physicians to suggest that such might have been the case,

and the history reveals that these physicians based their opinions upon microscopic studies. The patient had no symptoms whatever during the sexual excitement of a courtship lasting nine months. Further, his discharge did not appear until five days after marriage. While it is, of course, possible for gonorrhea to remain so quiescent that practically nothing but coitus will stir it into activity, it is hardly likely to have a period of five days elapse before it makes its appearance. In fact, if one were to judge solely by what is usual, there would be as much reason for thinking that this five-day period indicated that he really contracted the later disease from his wife If the infection was from the original attack, it should have appeared much earlier without a definite incubation period. On the other hand, five days is rather too short a period for a change in character of a "strain" of gonococci, to which he may have become refractory, through transplantation upon another soil. The answer to this phase of the matter, therefore, is that so many things are possible that no one can say what really was the case regarding the true source of the infection, whether it came from his wife or himself.

Turning to his disease-history, we see in April a disease, dating at least from the preceding October, beset with a series of local and systemic complications and subjected to constant insults of conduct and treatment.

Treatment.—Such a case offers much food for thought, both from the standpoint of prognosis and therapeutic efforts. The arthritis, and repeated insults to which the disease had been subjected, speak for the very slow establishment of any antibody efforts whatever. The activity of the infection at such a late day speaks for the utmost gentleness on the part of the physician, and the strictest adherence to a proper hygiene on the part of the patient. Obviously, a patient who has had joint involvements and two attacks of epididymitis has been overwhelmed with antigenic substances, and should receive no gonococcal vaccines.

Other than support and pressure to the epididymis, it would be decidedly hazardous to carry out any type of local treatment for at least several weeks.

When the activity has subsided so that there is no vesical discomfort, and the second glass of urine has cleared or nearly cleared, the patient should be placed upon gentle intravesical irrigations of 1 : 5000 potassium permanganate, as has been previously described, until such time as it is safe to attack the residual infection in the prostate, and possibly the seminal vesicles.

Case 48

Anteroposterior gonorrhea, erroneous diagnosis of stricture through rapid passing of sounds, ill-advised cystotomy, erroneous diagnosis of vesical tuberculosis, later good treatment removing pathology, and retention of psychological trends causing urinary difficulties through the development of habits.

History.—Two years before the patient had had an anteroposterior gonorrheal infection for which he had received permanganate irrigations. From the onset of his posterior symptoms he had had a small stream, causing him to strain considerably to empty his bladder. He had been told that he had a stricture, and the urethra had been dilated upon a number of occasions. It had not been necessary to start with a small sound and gradually increase the size. He stated that the doctor always passed the instrument very rapidly, and each time would say that the stricture was easy to dilate, but that it recontracted almost immediately. Finally he had developed an extremely acute cystitis, and after a few days his doctor, who was also a surgeon, had done a suprapubic cystotomy. Finding what he called a "general tuberculosis of the bladder wall," he had allowed the bladder to close. After convalescence he had visited another doctor who had massaged his prostate twice a week for four months. During this time

all of his subjective and objective symptoms had cleared up, except that he had continued to have a small stream, marked diurnal frequency of urination, and suprapubic pain when the bladder was allowed completely to fill. He, however, had experienced no difficulty at night, having been able to sleep all night without voiding or discomfort.

Examination.—There was no urethral discharge, nor had there been after the first two months of prostatic massage. The urine was crystalline, and its sediment showed no pus. A No. 27 F. sound passed freely through a perfectly soft urethral canal. The bladder was slightly trabeculated, but otherwise normal. The ureteral orifices, trigone, vesical outlet, and urethra were normal. The knee-jerks were plus, and the Wassermann test of both spinal fluid and blood were negative. A neurologist reported no evidence of brain or cord lesion, and attributed his exaggerated reflexes to his neurotic temperament. His prostatic and seminal fluids were normal, as were also his catheterized kidney urines.

Discussion.—Gonorrheal stricture is an aftermath and not a complication of gonorrhea. There had been no urethral trauma or disease prior to his attack of gonorrhea. Further, a full-sized sound was used from the start of his dilatations. If there was a resilient stricture, what became of it? It was not cut and it was not present two years later, as it most surely would have been if it ever had have been present. Undoubtedly it never had been present. How was the surgeon deceived? The patient complained of a small stream difficult to start. The doctor passed his sounds with such speed as to cause a spasmodic contracture of the cut-off muscle, causing the sensation of a gripping of the instrument. One can get the same sensation to the finger by forcing it quickly through the anal sphincter. Particularly does this occur in nervous, apprehensive individuals.

But why the cystotomy? That is one of those unfortunate errors that at times occur. They seem perfectly plausible to the

one who does them and equally assinine to every one else. The patient was having sounds roughly passed, possibly before his gonococci had left the scene of action, and was well entitled to have an acute cystitis develop at some time during these onslaughts. Beyond a doubt, the "generalized vesical tuberculosis" seen at operation was simply an acute non-tuberculous cystitis. Tuberculosis of the urogenital tract is practically always a progressive disease. It is not there today and gone tomorrow.

Why the small stream, diurnal frequency, and pain when the bladder was full? A small stream in the absence of obstruction, and there was none, means either a true nerve lesion or psychological meddling with the act of urination. There was no evidence of the former and every evidence of the latter. Instead of trying to relax the compressor urethræ muscle, as he should do to urinate, he forced it by holding his breath and contracting his abdominal muscles. Not only would this cause a small stream, but it would account for his difficulty in starting it, and the repeated increases of intravesical pressure occasioned by this habit had caused, as they would, a mild degree of back-pressure bladder.

Diurnal frequency in the presence of a normal urine and the absence of vesical stone at times is due to vesical tug from operative or other adhesions. More often it is the result of a too active psychology wherein are developed an assortment of vesical phobias. The fear of injuring the bladder if it is allowed to overdistend is perhaps the most common one encountered. He had it to an eminent degree, and it accounted for his "pain" when he retained his urine. Sleep banished the fear as well as the pain which, in reality, was nothing but the discomfort we all feel when the bladder contains too much urine.

Treatment.—Having a perfectly normal urogenital tract, his treatment consisted of convincing him of it. He needed only to have his fears erased, and the correction of his harmful habits would be a comparatively simple matter.

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